APPENDIX E - AIR QUALITY

Introduction

This Air Quality Appendix provides modeling assumptions and backup for results presented in Sections 7.11 and 8.11 for Air Quality and Sections 7.12 and 8.12 for Greenhouse Gases. Included within this documentation is a brief description of the methodology employed along with pertinent calculations and data used in the emissions and dispersion calculations supporting the microscale and mesoscale air quality analyses.

Motor Vehicle Emissions

The EPA MOBILE6.2 computer program generated motor vehicle emissions used in the garage stationary source analysis along with the mobile source CAL3QHC modeling and mesoscale analysis. The model input parameters were provided by MassDEP. Emission rates were derived for 2012 and 2022 for speed limits of 2.5, 10, 15, and 30 mph on arterial roadways for use in the microscale analyses. Emission rates for speeds in increments of 5 mph were used for the mesoscale analysis. In addition, a 35 mph speed for highway ramps was also used in the mesoscale analysis.

Microscale

Intersections used in the microscale analysis were chosen from the set of signalized intersections studied in the traffic analysis presented in Sections 7.1 and 8.1. According to microscale modeling guidance, the top three intersections with the highest traffic volumes and the top three intersections ranked by Level-of-Service (LOS) are to be modeled. It is assumed that if analysis of these intersections shows no exceedances of the CO NAAQS, none of the lower ranked intersections will.

Of the 54 intersections studied in the traffic analysis, 22 are signalized intersections. The remaining are controlled with stop signs and not considered for this analysis. It is presumed that the worst intersections already are or will be controlled using traffic signals.

For each of the 22 signalized intersections, traffic counts were totaled for each. Each intersection for each scenario combination (weekday AM, weekday PM, Saturday midday for 2012 existing, 2022 no build, and 2022 build) was assigned a ranking from 1 to 22 based on total vehicles at the intersection. Additionally, each intersection was assigned a value of 1 through 22 based on LOS. Since there are only six LOS categories, the rankings by LOS included multiples of each. That is, if there were five intersections with LOS of "F", and two with LOS of "E", then the five "F" intersections would all be ranked "1", while the "E" intersections would be ranked "6", and so on. The LOS rankings for each scenario combination were summed and ranked from 1 to 22. Similarly, the vehicle volume rankings were summed and ranked. The top three intersections for LOS were selected for modeling. Although the ramp intersections from Route 24 were ranked in the top three for volumes, lack of pedestrian access in the area led to disqualification of this intersection.

For the intersections studied in the microscale analysis, the CAL3QHC model was applied to calculate CO concentrations at sensitive receptor locations using emission rates derived in MOBILE6.2. The intersection's queue links and free flow links were input to the model along with sensitive receptors at all locations nearby each intersection. The meteorological assumptions input into the model were a 1.0 meter per second wind speed, Pasquill-Gifford Class D stability combined with a mixing height of 1000 meters. For each direction, the full range of wind directions at 10 degree intervals was examined. In addition, a surface roughness (z_0) of 100 cm was used for all intersections. Idle emission rates for queue links were based on 2.5 mph emission rates derived in MOBILE6.2 and converted from grams per mile to grams per hour. Emission rates for speeds of 10, 15, and 30 mph were used for right turn, left turn, and free flow links, respectively.

Mesoscale

The mesoscale analysis was conducted using Microsoft Excel. Peak hourly vehicle counts were obtained from the traffic analyses, and combined with the MOBILE6 emission factors to estimate vehicle emissions of NO_X, VOC, and CO_2. Intersection emissions were based on modeled average overall delay times for each intersection. Roadway emissions were based on the estimated length of each link as well as an assumed idle time on each link of 1 minute per vehicle per hour to account for slowdowns and random stops.

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Roads

	VOC lbs/day	VOC tons/yr	NOx lbs/day	NOx tons/yr	CO2 lbs/day	CO2 tons/yr
2012 Existing	360.3	56.2	824.0	128.5	620605.8	96814.5
2022 No Action	223.6	34.9	270.7	42.2	678114.1	105785.8
delta from Existing	-136.7	-21.3	-553.2	-86.3	57508.4	8971.3
2022 Build Alternative A	236.0	36.8	285.7	44.6	715510.5	111619.6
delta from No Action	12.5	1.9	14.9	2.3	37396.4	5833.8
2022 Build Alternative A Mitigated	236.0	36.8	285.6	44.6	715330.9	111591.6
delta from Build Alternative A	0.0	0.0	-0.1	0.0	-179.6	-28.0
2022 Build Alternative B	232.8	36.3	281.9	44.0	706008.2	110137.3
delta from No Action	9.3	1.4	11.1	1.7	27894.0	4351.5
2022 Build Alternative B Mitigated	232.7	36.3	281.8	44.0	705726.5	110093.3
delta from Build Alternative B	-0.1	0.0	-0.1	0.0	-281.7	-43.9

Intersections

	VOC lbs/day	VOC tons/yr	NOx lbs/day	NOx tons/yr	CO2 lbs/day	CO2 tons/yr
2012 Existing	36.9	5.8	22.7	3.5	9358.5	1459.9
2022 No Action	26.1	4.1	7.8	1.2	10373.8	1618.3
delta from Existing	-10.8	-1.7	-14.9	-2.3	1015.3	158.4
2022 Build Alternative A	31.5	4.9	9.4	1.5	12536.8	1955.7
delta from No Action	5.4	0.8	1.6	0.3	2162.9	337.4
2022 Build Alternative A Mitigated	26.7	4.2	7.9	1.2	10606.3	1654.6
delta from Build Alternative A	-4.9	-0.8	-1.4	-0.2	-1930.5	-301.2
2022 Build Alternative B	27.2	4.2	8.1	1.3	10808.8	1686.2
delta from No Action	1.1	0.2	0.3	0.1	434.9	67.8
2022 Build Alternative B Mitigated	25.6	4.0	7.6	1.2	10177.7	1587.7
delta from Build Alternative B	-1.6	-0.2	-0.5	-0.1	-631.1	-98.4

Total

Pollutant	VOC lbs/day	VOC tons/yr	NOx lbs/day	NOx tons/yr	CO2 lbs/day	CO2 tons/yr
2012 Existing	397.1	62.0	846.6	132.1	629964.3	98274.4
2022 No Action	249.6	38.9	278.5	43.4	688488.0	107404.1
delta from Existing	-147.5	-23.0	-568.1	-88.6	58523.7	9129.7
2022 Build Alternative A	267.6	41.7	295.0	46.0	728047.3	113575.4
delta from No Action	17.9	2.8	16.5	2.6	39559.3	6171.3
2022 Build Alternative A Mitigated	262.7	41.0	293.5	45.8	725937.1	113246.2
delta from Build Alternative A	-4.9	-0.8	-1.5	-0.2	-2110.2	-329.2
2022 Build Alternative B	260.0	40.6	290.0	45.2	716817.0	111823.4
delta from No Action	10.4	1.6	11.5	1.8	28329.0	4419.3
2022 Build Alternative B Mitigated	258.3	40.3	289.4	45.1	715904.2	111681.1
delta from Build Alternative B	-1.7	-0.3	-0.6	-0.1	-912.7	-142.4

Minor differences in sums are due to rounding of individual values.

Pound per day to tons per year is based on an 85% factor to account for peak daily to annual data.

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

	Case 1	Case 2
	2022	2022
	Build Alt A minus No Action	Build Alt A (Mitigated) minus No Action
Net VMT, miles/day	29,723	29,304
Roadway GHG, tpy	5,834	5,752
Net Delay, hrs/day	689	24
Intersection GHG, tpy	337	12
Net GHG Emissions, tpy	6,171	5,763
Percent Change	---	-7%

	Case 1	Case 2
	2022	2022
	Build Alt B minus No Action	Build Alt B (Mitigated) minus No Action
Net VMT, miles/day	22,173	21,949
Roadway GHG, tpy	4,351	4,308
Net Delay, hrs/day	139	-63
Intersection GHG, tpy	68	-31
Net GHG Emissions, tpy	4,419	4,277
Percent Change	---	-3%

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project	2012 Existing Friday AM Peak			2012 Existing Friday PM Peak			2012 Existing Saturday Midday Peak		
Intersections (Signalized and *Unsignalized*)	LOS	Delay (Sec)	Traffic Volume	LOS	Delay (Sec)	Traffic Volume	LOS	Delay (Sec)	Traffic Volume
2. Galleria Mall Drive South/County Street	A	3.0	588	A	7.1	1459	A	7.2	1419
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	A	10.9	762	B	12.8	1420	B	12.1	1119
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	A	5.3	3300	A	3.3	4209	A	3.5	3275
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	B	15.1	2458	D	46.9	3843	C	20.8	3060
9. Mozzone Boulevard/County Street (Route 140)	A	4.1	1718	B	16.0	2485	A	10.0	2368
11. Erika Drive/County Street (Route 140)	B	14.0	1735	C	22.6	2649	C	29.2	2788
12. Hart Street/County Street (Route 140)	E	55.0	2095	F	98.3	2860	F	92.9	2893
15. Washington Street/Broadway (Route 138)	C	26.7	1524	D	50.1	2032	C	22.6	1695
17. Oak Street /Washington Street/Tremont Street (Route 140)	C	26.7	1808	D	53.8	2258	C	26.3	1817
18. Cohannet Street (Route 140) / Weir Street (Route 138)	B	11.2	2293	A	9.3	2745	B	10.4	2629
22. High Street/Winthrop Street (Route 140)	C	21.6	1430	F	79.3	1989	C	30.8	1673
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	C	21.0	1677	C	26.9	1780	C	22.9	1853
33. County Street (Route 140)/Riverway Ext.	C	29.0	1712	B	19.3	1859	C	34.2	1622
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	E	59.3	2925	D	46.2	3507	D	38.7	3171
35. Winthrop Street (Route 44)/Highland Street	C	20.6	1234	D	41.4	1765	C	25.9	1623
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	B	17.8	1278	D	39.2	1623	A	9.7	1175
47. Cape Highway (Route 44)/Church Street	B	13.4	1714	B	19.7	2297	B	15.5	2090
49. Cape Highway (Route 44)/Orchard Street	D	46.9	2984	F	130.4	4084	E	60.6	3643
50. Broadway (Route 138)/I-495 NB Ramps	B	13.7	2311	C	32.0	2683	B	12.1	1868
51. Broadway (Route 138)/I-495 SB Ramps	B	18.6	2364	B	14.3	2880	B	12.1	1989
52. Pleasant Street (Route 104)/Route 24 NB Ramps	A	4.5	2428	A	4.0	2620	A	2.9	2023
53. Pleasant Street (Route 104)/Route 24 SB Ramps	A	8.5	1615	B	12.8	2125	B	10.7	1451
4: O'Connell Way & Stevens Street	A	3.9	700	B	30.1	1101	A	4.3	644
7: Middleboro Avenue & Stevens Street	A	4.3	885	A	5.2	987	A	3.5	848
8: Hart Street & Poole Street	C	150.0	1195	C	71.6	1147	C	17.0	991
10: Hess Station & County Street (Route 140)	C	30.3	1805	D	11.9	2302	B	1.6	2101
13: Galleria Mall Drive South & Galleria Mall Drive	A	7.0	137	A	8.8	1022	A	9.6	1176
14: Exeter Street & Broadway (Route 138)	F	80.0	1494	H	80.0	1727	F	80.0	1457
16: Driveway & Washington Street	E	150.0	1779	H	150.0	2285	E	79.6	1769
19: Court Street & Broadway (Route 138)	A	3.4	1637	C	5.1	2028	B	3.9	1921
20: Post Office Square & Court Street	A	16.5	1235	B	36.3	1785	A	35.9	1602
21: Cohannet Street & Western Green	B	15.0	1396	C	25.0	1796	C	25.0	1796
24: Summer Street (Route 140) & Ingell Street	E	44.5	1418	F	50.9	1526	E	14.8	1312
25: County Street (Route 140) & Johnson Street	A	2.6	1440	B	1.6	1699	B	1.7	1589
26: Myricks Street & Route 79 NB Ramp	B	4.2	919	C	3.9	1109	B	2.7	909
27: Myricks Street & Route 79 SB Ramp	A	4.1	736	B	31.3	1023	A	6.2	764
28: Middleboro Avenue & Old Colony Avenue	B	93.4	952	D	150.0	1265	C	150.0	1085
29: Pinehill Road & Middleboro Avenue	C	63.2	1082	D	70.2	1194	C	22.1	968
30: Pinehill Road & Stevens Street	A	4.2	514	A	5.5	684	A	4.2	481
31: Cohannet Street & F.R. Martin Parkway (Route 140)	A	10.6	641	D	44.0	1140	A	11.4	780
32: Gordon Owen Parkway & Williams Street	D	35.0	1312	F	150.0	1473	D	83.0	1230
36: Secondary Driveway & Stevens Street									
37: 495 NB Ramp & Route 105	B	150.0	1746	B	3.5	1826	A	5.2	1567
38: 495 SB Ramp & Route 105	A	23.9	1290	B	17.5	1818	A	9.0	1391
40: Taunton Street & Route 18	B	7.3	1043	B	8.6	1208	A	3.6	953
41: 495 NB Ramp & Route 18	B	4.7	1239	A	2.2	1343	A	2.3	1004
42: 495 SB Ramp & Route 18	B	4.9	1254	D	97.8	1762	A	3.5	1063
44: Route 44 & 495 NB Ramp	H	14.7	2518	H	5.3	2497	H	5.6	2539
45: Route 44 & 495 SB Ramp	E	110.0	2128	F	124.5	2369	D	41.5	2225
46: Route 44 & Richmond Street	D	6.9	1585	G	55.6	1987	E	15.7	1843
48: Route 44 & Hill Street	D	10.7	1768	F	15.0	2174	F	35.3	2115
54: Paddleford Street & Route 24 NB Ramp	A	2.6	635	A	2.3	606	A	2.1	581
55: Paddleford Street & Route 24 SB Ramp	A	2.4	645	A	6.2	883	A	5.0	719
58: Middleboro Avenue & Waterpark Driveway									

LOS is HCM value for signalized intersections and ICU value for unsignalized intersections.
Color Code:
Red – Signalized intersections at LOS D or worse.
Green – Top 3 signalized intersections based on volume.
Dark Blue – Volume increase >20%
Light Blue – Volume increase > 10%
Yellow – Unsignalized intersection with delay > 150s. Capped at 150s
Gold – Unsignalized intersection with missing delay. Assigned value based on HCM LOS
A – 10s
B – 15s
C – 25s
D – 35s
E – 50 s
F or worse – 80s
Orange with italic font – Signal Added in Build or Build with Mitigation Scenario
Pink – Not analyzed or calculated.

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project	2022 No Action Friday AM Peak			2022 No Action Friday PM Peak			2022 No Action Saturday Midday Peak		
Intersections (Signalized and *Unsignalized*)	LOS	Delay (Sec)	Traffic Volume	LOS	Delay (Sec)	Traffic Volume	LOS	Delay (Sec)	Traffic Volume
2. Galleria Mall Drive South/County Street	A	2.5	818	A	7.1	1630	A	7.0	1606
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	B	14.2	1099	B	13.7	1762	B	13.6	1380
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	A	6.0	3688	A	3.7	4655	A	3.5	3610
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	B	17.9	2766	E	88.9	4144	C	21.6	3327
9. Mozzone Boulevard/County Street (Route 140)	A	4.2	1838	C	22.7	2647	B	12.7	2523
11. Erika Drive/County Street (Route 140)	B	14.2	1852	C	22.9	2822	C	28.3	2969
12. Hart Street/County Street (Route 140)	C	31.0	2263	D	39.9	3073	D	36.9	2980
15. Washington Street/Broadway (Route 138)	C	25.8	1622	D	43.2	2161	C	24.2	1802
17. Oak Street /Washington Street/Tremont Street (Route 140)	C	26.9	1924	D	41.1	2403	C	25.2	1933
18. Cohannet Street (Route 140) / Weir Street (Route 138)	B	11.9	2444	A	9.8	2923	B	10.9	2797
22. High Street/Winthrop Street (Route 140)	C	21.7	1530	F	81.1	2124	C	34.1	1783
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	C	21.8	1789	C	29.7	1900	C	24.6	1973
33. County Street (Route 140)/Riverway Ext.	C	30.9	1853	C	21.5	2004	B	17.2	1747
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	D	43.6	3119	D	53.9	3803	D	41.1	3378
35. Winthrop Street (Route 44)/Highland Street	C	20.6	1322	D	45.5	1379	C	25.1	1696
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	B	17.6	1398	D	41.9	1757	B	10.1	1273
47. Cape Highway (Route 44)/Church Street	B	13.3	1861	C	20.4	2473	B	13.3	2246
49. Cape Highway (Route 44)/Orchard Street	E	54.2	3208	F	153.0	4370	E	63.7	3894
50. Broadway (Route 138)/I-495 NB Ramps	B	12.7	2453	D	54.3	2849	B	12.2	1983
51. Broadway (Route 138)/I-495 SB Ramps	C	21.2	2510	B	14.2	3058	B	11.8	2113
52. Pleasant Street (Route 104)/Route 24 NB Ramps	A	4.6	2590	A	4.2	2793	A	2.9	2157
53. Pleasant Street (Route 104)/Route 24 SB Ramps	A	7.5	1726	B	13.3	2256	B	10.8	1546
4: O'Connell Way & Stevens Street	A	7.4	1064	D	150.0	1456	A	6.1	891
7: Middleboro Avenue & Stevens Street	A	2.8	973	A	7.6	1077	A	3.9	924
8: Hart Street & Poole Street	D	150.0	1303	D	78.5	1247	D	20.3	1075
10: Hess Station & County Street (Route 140)	C	7.2	1929	D	8.4	2455	C	1.5	2240
13: Galleria Mall Drive South & Galleria Mall Drive	A	7.1	150	A	9.0	1085	A	10.0	1249
14: Exeter Street & Broadway (Route 138)	G	80.0	1588	H	80.0	1836	F	80.0	1551
16: Driveway & Washington Street	F	136.6	1896	H	150.0	2434	F	60.4	1883
19: Court Street & Broadway (Route 138)	A	3.4	1743	C	5.1	2163	C	4.3	2044
20: Post Office Square & Court Street	A	15.0	1314	B	43.7	1902	B	45.8	1704
21: Cohannet Street & Western Green	B	15.0	1494	D	35.0	1914	C	25.0	1914
24: Summer Street (Route 140) & Ingell Street	F	30.3	1528	G	60.0	1639	E	14.1	1409
25: County Street (Route 140) & Johnson Street	B	3.1	1608	C	2.0	1912	C	2.9	1786
26: Myricks Street & Route 79 NB Ramp	B	4.0	1016	D	3.4	1261	B	2.6	991
27: Myricks Street & Route 79 SB Ramp	A	4.2	787	B	37.5	1117	A	7.1	825
28: Middleboro Avenue & Old Colony Avenue	B	40.2	1024	E	150.0	1355	C	109.1	1162
29: Pinehill Road & Middleboro Avenue	D	27.2	1163	E	49.1	1283	C	19.5	1040
30: Pinehill Road & Stevens Street	A	4.4	596	A	5.7	769	A	4.3	545
31: Cohannet Street & F.R. Martin Parkway (Route 140)	A	11.1	689	D	58.4	1216	B	13.3	833
32: Gordon Owen Parkway & Williams Street	E	150.0	1406	F	150.0	1574	E	63.4	1316
36: Secondary Driveway & Stevens Street									
37: 495 NB Ramp & Route 105	C	150.0	1890	B	3.1	1965	B	5.3	1687
38: 495 SB Ramp & Route 105	A	10.3	1409	C	22.4	1967	A	15.2	1504
40: Taunton Street & Route 18	B	5.0	1105	B	5.6	1281	A	3.4	1011
41: 495 NB Ramp & Route 18	B	5.1	1315	B	2.0	1427	A	2.2	1065
42: 495 SB Ramp & Route 18	C	3.8	1331	D	150.0	1871	A	3.0	1127
44: Route 44 & 495 NB Ramp	H	15.3	2714	H	5.2	2686	H	7.2	2722
45: Route 44 & 495 SB Ramp	E	142.8	2301	F	150.0	2550	E	57.6	2390
46: Route 44 & Richmond Street	D	5.5	1723	H	46.7	2144	E	9.6	1984
48: Route 44 & Hill Street	D	5.6	1916	F	11.4	2343	G	19.7	2272
54: Paddleford Street & Route 24 NB Ramp	A	2.3	674	A	2.3	642	A	1.7	615
55: Paddleford Street & Route 24 SB Ramp	A	2.4	688	A	6.5	940	A	4.7	766
58: Middleboro Avenue & Waterpark Driveway									

LOS is HCM value for signalized intersections and ICU value for unsignalized intersections.
Color Code:
Red – Signalized intersections at LOS D or worse.
Green – Top 3 signalized intersections based on volume.
Dark Blue – Volume increase >20%
Light Blue – Volume increase > 10%
Yellow – Unsignalized intersection with delay > 150s. Capped at 150s
Gold – Unsignalized intersection with missing delay. Assigned value based on HCM LOS
A – 10s
B – 15s
C – 25s
D – 35s
E – 50 s
F or worse – 80s
Orange with italic font – Signal Added in Build or Build with Mitigation Scenario
Pink – Not analyzed or calculated.

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project	2022 Build Alternative A Friday AM Peak				2022 Build Alternative A Friday PM Peak				2022 Build Alternative A Saturday Midday Peak			
Intersections (Signalized and *Unsignalized*)	**LOS**	**Delay (Sec)**	**Traffic Volume**	**No-Build to Build Volume % Increase**	**LOS**	**Delay (Sec)**	**Traffic Volume**	**No-Build to Build Volume % Increase**	**LOS**	**Delay (Sec)**	**Traffic Volume**	**No-Build to Build Volume % Increase**
2. Galleria Mall Drive South/County Street	A	2.5	819	0%	A	5.8	2398	47%	A	6.0	1967	22%
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	B	14.3	1107	1%	F	177.6	3155	79%	B	19.4	2042	48%
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	A	6.5	3711	1%	A	9.0	5696	22%	A	3.8	4102	14%
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	B	17.9	2771	0%	F	110.0	4822	16%	D	35.1	3642	9%
9. Mozzone Boulevard/County Street (Route 140)	A	4.2	1841	0%	C	27.2	2735	3%	B	13.9	2564	2%
11. Erika Drive/County Street (Route 140)	B	14.2	1855	0%	C	23.7	2910	3%	C	28.5	3010	1%
12. Hart Street/County Street (Route 140)	C	30.7	2255	0%	D	42.6	3184	4%	D	37.6	3034	2%
15. Washington Street/Broadway (Route 138)	C	25.8	1620	0%	D	43.2	2175	1%	C	24.2	1809	0%
17. Oak Street /Washington Street/Tremont Street (Route 140)	C	26.8	1921	0%	D	41.4	2421	1%	C	23.7	1840	-5%
18. Cohannet Street (Route 140) / Weir Street (Route 138)	B	11.9	2446	0%	A	10.0	2955	1%	B	11.0	2812	1%
22. High Street/Winthrop Street (Route 140)	C	21.8	1529	0%	F	95.6	2177	2%	D	35.2	1808	1%
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	C	21.8	1788	0%	C	29.5	1931	2%	C	24.6	1988	1%
33. County Street (Route 140)/Riverway Ext.	C	34.3	1882	2%	C	24.8	2108	5%	B	17.8	1797	3%
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	D	42.9	3112	0%	E	55.5	3821	0%	D	41.1	3385	0%
35. Winthrop Street (Route 44)/Highland Street	C	20.6	1321	0%	D	49.6	1932	40%	C	25.8	1721	1%
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	B	17.3	1388	-1%	D	50.9	1862	6%	B	10.6	1326	4%
47. Cape Highway (Route 44)/Church Street	B	13.3	1851	-1%	C	24.9	2578	4%	B	13.2	2199	-2%
49. Cape Highway (Route 44)/Orchard Street	D	53.8	3200	0%	F	215.2	4476	2%	E	73.1	3945	1%
50. Broadway (Route 138)/I-495 NB Ramps	B	12.7	2453	0%	D	54.3	2849	0%	B	12.2	1983	0%
51. Broadway (Route 138)/I-495 SB Ramps	C	21.2	2510	0%	B	14.2	3058	0%	B	11.8	2113	0%
52. Pleasant Street (Route 104)/Route 24 NB Ramps	A	4.5	2585	0%	A	4.2	2817	1%	A	2.9	2168	1%
53. Pleasant Street (Route 104)/Route 24 SB Ramps	A	7.5	1721	0%	B	13.2	2271	1%	B	10.8	1552	0%
4: O'Connell Way & Stevens Street	A	7.5	1076	1%	H	80.0	2848	96%	C	150.0	1552	74%
7: Middleboro Avenue & Stevens Street	A	2.7	958	-2%	A	9.3	1113	3%	A	4.3	941	2%
8: Hart Street & Poole Street	D	150.0	1288	-1%	D	91.5	1283	3%	D	22.6	1092	2%
10: Hess Station & County Street (Route 140)	C	7.2	1932	0%	D	11.0	2543	4%	C	1.5	2281	2%
13: Galleria Mall Drive South & Galleria Mall Drive	A	7.1	150	0%	A	9.0	1085	0%	A	10.0	1249	0%
14: Exeter Street & Broadway (Route 138)	G	80.0	1588	0%	H	80.0	1852	1%	G	80.0	1557	0%
16: Driveway & Washington Street	F	134.2	1893	0%	H	150.0	2453	1%	F	66.5	1890	0%
19: Court Street & Broadway (Route 138)	A	3.4	1741	0%	C	5.1	2184	1%	C	4.3	2054	0%
20: Post Office Square & Court Street	A	15.0	1315	0%	B	46.5	1918	1%	B	47.1	1711	0%
21: Cohannet Street & Western Green	B	15.0	1491	0%	D	35.0	1940	1%	C	25.0	1924	1%
24: Summer Street (Route 140) & Ingell Street	H	49.2	1806	18%	G	84.1	1724	5%	E	16.7	1449	3%
25: County Street (Route 140) & Johnson Street	B	3.0	1600	0%	D	2.8	2024	6%	C	3.5	1837	3%
26: Myricks Street & Route 79 NB Ramp	B	4.0	1045	3%	D	3.5	1299	3%	C	2.5	1044	5%
27: Myricks Street & Route 79 SB Ramp	A	4.8	801	2%	C	70.5	1152	3%	A	8.2	849	3%
28: Middleboro Avenue & Old Colony Avenue	B	40.3	1021	0%	E	150.0	1352	0%	C	123.8	1179	1%
29: Pinehill Road & Middleboro Avenue	D	26.3	1159	0%	E	58.9	1320	3%	C	20.7	1059	2%
30: Pinehill Road & Stevens Street	A	4.3	576	-3%	A	6.6	842	9%	A	4.5	581	7%
31: Cohannet Street & F.R. Martin Parkway (Route 140)	A	11.0	683	-1%	D	67.9	1234	1%	B	13.8	840	1%
32: Gordon Owen Parkway & Williams Street	E	150.0	1401	0%	G	150.0	1592	1%	E	65.4	1325	1%
36: Secondary Driveway & Stevens Street	A	0.2	511		A	1.9	1015		A	0.8	613	
37: 495 NB Ramp & Route 105	C	150.0	1879	-1%	C	3.9	2043	4%	B	8.8	1724	2%
38: 495 SB Ramp & Route 105	A	10.1	1399	-1%	C	43.4	2072	5%	B	22.4	1555	3%
40: Taunton Street & Route 18	B	5.0	1105	0%	B	5.6	1281	0%	A	3.4	1011	0%
41: 495 NB Ramp & Route 18	B	5.1	1315	0%	B	2.0	1427	0%	A	2.2	1065	0%
42: 495 SB Ramp & Route 18	C	3.8	1331	0%	D	150.0	1871	0%	A	3.0	1127	0%
44: Route 44 & 495 NB Ramp	H	14.5	2704	0%	H	6.2	2791	4%	H	8.0	2775	2%
45: Route 44 & 495 SB Ramp	E	143.5	2291	0%	G	116.8	2600	2%	E	61.6	2443	2%
46: Route 44 & Richmond Street	D	5.4	1713	-1%	H	60.5	2249	5%	E	8.3	1937	-2%
48: Route 44 & Hill Street	D	5.5	1906	-1%	G	14.5	2448	4%	G	22.7	2325	2%
54: Paddleford Street & Route 24 NB Ramp	A	2.3	674	0%	A	2.3	642	0%	A	1.7	615	0%
55: Paddleford Street & Route 24 SB Ramp	A	2.4	687	0%	A	6.7	954	1%	A	4.8	773	1%
58: Middleboro Avenue & Waterpark Driveway					A	0	1025					

LOS is HCM value for signalized intersections and ICU value for unsignalized intersections.
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Dark Blue – Volume increase >20%
Light Blue – Volume increase > 10%
Yellow – Unsignalized intersection with delay > 150s. Capped at 150s
Gold – Unsignalized intersection with missing delay. Assigned value based on HCM LOS
A – 10s
B – 15s
C – 25s
D – 35s
E – 50 s
F or worse – 80s
Orange with italic font – Signal Added in Build or Build with Mitigation Scenario
Pink – Not analyzed or calculated.

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project	2022 Build Alternative B Friday AM Peak				2022 Build Alternative B Friday PM Peak				2022 Build Alternative B Saturday Midday Peak			
Intersections (Signalized and *Unsignalized*)	**LOS**	**Delay (Sec)**	**Traffic Volume**	**No-Build to Build Volume % Increase**	**LOS**	**Delay (Sec)**	**Traffic Volume**	**No-Build to Build Volume % Increase**	**LOS**	**Delay (Sec)**	**Traffic Volume**	**No-Build to Build Volume % Increase**
2. Galleria Mall Drive South/County Street	A	2.5	848	4%	A	6.1	2101	29%	A	6.3	1813	13%
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	B	14.6	1159	5%	F	81.8	2631	49%	B	16.4	1765	28%
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	A	6.6	3742	1%	A	5.5	5303	14%	A	3.6	3898	8%
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	B	18.2	2794	1%	F	97.0	4558	10%	C	28.1	3512	6%
9. Mozzone Boulevard/County Street (Route 140)	A	4.2	1838	0%	C	22.7	2647	0%	B	12.7	2523	0%
11. Erika Drive/County Street (Route 140)	B	14.2	1852	0%	C	22.9	2822	0%	C	28.3	2969	0%
12. Hart Street/County Street (Route 140)	C	31.0	2263	0%	D	39.9	3073	0%	D	36.9	2980	0%
15. Washington Street/Broadway (Route 138)	C	25.8	1622	0%	D	43.2	2161	0%	C	24.2	1802	0%
17. Oak Street /Washington Street/Tremont Street (Route 140)	C	26.9	1924	0%	D	41.1	2403	0%	C	25.2	1933	0%
18. Cohannet Street (Route 140) / Weir Street (Route 138)	B	11.9	2444	0%	A	9.8	2923	0%	B	10.9	2797	0%
22. High Street/Winthrop Street (Route 140)	C	21.7	1530	0%	F	81.1	2124	0%	C	34.1	1783	0%
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	C	21.8	1789	0%	C	29.7	1900	0%	C	24.6	1973	0%
33. County Street (Route 140)/Riverway Ext.	C	30.9	1853	0%	C	21.5	2004	0%	B	17.2	1747	0%
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	D	43.6	3119	0%	D	53.9	3803	0%	D	41.1	3378	0%
35. Winthrop Street (Route 44)/Highland Street	C	20.6	1322	0%	D	45.5	1379	0%	C	25.1	1696	0%
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	B	17.6	1398	0%	D	41.9	1757	0%	B	10.1	1273	0%
47. Cape Highway (Route 44)/Church Street	B	13.3	1861	0%	C	20.4	2473	0%	B	13.3	2246	0%
49. Cape Highway (Route 44)/Orchard Street	E	54.2	3208	0%	F	153.0	4370	0%	E	63.7	3894	0%
50. Broadway (Route 138)/I-495 NB Ramps	B	12.7	2453	0%	D	54.3	2849	0%	B	12.2	1983	0%
51. Broadway (Route 138)/I-495 SB Ramps	C	21.2	2510	0%	B	14.2	3058	0%	B	11.8	2113	0%
52. Pleasant Street (Route 104)/Route 24 NB Ramps	A	4.6	2590	0%	A	4.2	2793	0%	A	2.9	2157	0%
53. Pleasant Street (Route 104)/Route 24 SB Ramps	A	7.5	1726	0%	B	13.3	2256	0%	B	10.8	1546	0%
4: O'Connell Way & Stevens Street	A	10.5	1127	6%	G	80.0	2325	60%	B	44.4	1277	43%
7: Middleboro Avenue & Stevens Street	A	2.8	973	0%	A	7.6	1077	0%	A	3.9	924	0%
8: Hart Street & Poole Street	D	150	1303	0%	D	78.5	1247	0%	D	20.3	1075	0%
10: Hess Station & County Street (Route 140)	C	7.2	1929	0%	D	8.4	2455	0%	C	1.5	2240	0%
13: Galleria Mall Drive South & Galleria Mall Drive	A	7.1	150	0%	A	9	1085	0%	A	10	1249	0%
14: Exeter Street & Broadway (Route 138)	G	80	1588	0%	H	80	1836	0%	F	80	1551	0%
16: Driveway & Washington Street	F	136.6	1896	0%	H	150	2434	0%	F	60.4	1883	0%
19: Court Street & Broadway (Route 138)	A	3.4	1743	0%	C	5.1	2163	0%	C	4.3	2044	0%
20: Post Office Square & Court Street	A	15	1314	0%	B	43.7	1902	0%	B	45.8	1704	0%
21: Cohannet Street & Western Green	B	15	1494	0%	D	35	1914	0%	C	25	1914	0%
24: Summer Street (Route 140) & Ingell Street	F	30.3	1528	0%	G	60	1639	0%	E	14.1	1409	0%
25: County Street (Route 140) & Johnson Street	B	3.1	1608	0%	C	2	1912	0%	C	2.9	1786	0%
26: Myricks Street & Route 79 NB Ramp	B	4	1016	0%	D	3.4	1261	0%	B	2.6	991	0%
27: Myricks Street & Route 79 SB Ramp	A	4.2	787	0%	B	37.5	1117	0%	A	7.1	825	0%
28: Middleboro Avenue & Old Colony Avenue	B	40.2	1024	0%	E	150	1355	0%	C	109.1	1162	0%
29: Pinehill Road & Middleboro Avenue	D	27.2	1163	0%	E	49.1	1283	0%	C	19.5	1040	0%
30: Pinehill Road & Stevens Street	A	4.4	596	0%	A	5.7	769	0%	A	4.3	545	0%
31: Cohannet Street & F.R. Martin Parkway (Route 140)	A	11.1	689	0%	D	58.4	1216	0%	B	13.3	833	0%
32: Gordon Owen Parkway & Williams Street	E	150	1406	0%	F	150	1574	0%	E	63.4	1316	0%
36: Secondary Driveway & Stevens Street	A	0.3	525		A	1.7	996		A	0.7	597	
37: 495 NB Ramp & Route 105	C	150	1890	0%	B	3.1	1965	0%	B	5.3	1687	0%
38: 495 SB Ramp & Route 105	A	10.3	1409	0%	C	22.4	1967	0%	A	15.2	1504	0%
40: Taunton Street & Route 18	B	5	1105	0%	B	5.6	1281	0%	A	3.4	1011	0%
41: 495 NB Ramp & Route 18	B	5.1	1315	0%	B	2	1427	0%	A	2.2	1065	0%
42: 495 SB Ramp & Route 18	C	3.8	1331	0%	D	150	1871	0%	A	3	1127	0%
44: Route 44 & 495 NB Ramp	H	15.3	2714	0%	H	5.2	2686	0%	H	7.2	2722	0%
45: Route 44 & 495 SB Ramp	E	142.8	2301	0%	F	150	2550	0%	E	57.6	2390	0%
46: Route 44 & Richmond Street	D	5.5	1723	0%	H	46.7	2144	0%	E	9.6	1984	0%
48: Route 44 & Hill Street	D	5.6	1916	0%	F	11.4	2343	0%	G	19.7	2272	0%
54: Paddleford Street & Route 24 NB Ramp	A	2.3	674	0%	A	2.3	642	0%	A	1.7	615	0%
55: Paddleford Street & Route 24 SB Ramp	A	2.4	688	0%	A	6.5	940	0%	A	4.7	766	0%
58: Middleboro Avenue & Waterpark Driveway												

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Color Code:
Red – Signalized intersections at LOS D or worse.
Green – Top 3 signalized intersections based on volume.
Dark Blue – Volume increase >20%
Light Blue – Volume increase > 10%
Yellow – Unsignalized intersection with delay > 150s. Capped at 150s
Gold – Unsignalized intersection with missing delay. Assigned value based on HCM LOS
A – 10s
B – 15s
C – 25s
D – 35s
E – 50 s
F or worse – 80s
Orange with italic font – Signal Added in Build or Build with Mitigation Scenario
Pink – Not analyzed or calculated.

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project	2022 Build Alternative B Mitigated Friday AM Peak				2022 Build Alternative B Mitigated Friday PM Peak				2022 Build Alternative B Mitigated Saturday Midday Peak			
Intersections (Signalized and *Unsignalized*)	**LOS**	**Delay (Sec)**	**Traffic Volume**	**No-Build to Build Volume % Increase**	**LOS**	**Delay (Sec)**	**Traffic Volume**	**No-Build to Build Volume % Increase**	**LOS**	**Delay (Sec)**	**Traffic Volume**	**No-Build to Build Volume % Increase**
2. Galleria Mall Drive South/County Street	A	2.5	848	4%	A	6.1	2101	29%	A	6.3	1813	13%
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	B	17.2	1159	5%	C	33.2	2631	49%	C	20.1	1765	28%
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	A	6.6	3742	1%	A	5.5	5303	14%	A	3.6	3898	8%
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	B	15.4	2794	1%	C	29.1	4558	10%	B	18.6	3512	6%
9. Mozzone Boulevard/County Street (Route 140)	A	4.2	1838	0%	C	22.7	2647	0%	B	12.7	2523	0%
11. Erika Drive/County Street (Route 140)	B	14.2	1852	0%	C	22.9	2822	0%	C	28.3	2969	0%
12. Hart Street/County Street (Route 140)	C	31.0	2263	0%	D	39.9	3073	0%	D	36.9	2980	0%
15. Washington Street/Broadway (Route 138)	C	25.8	1622	0%	D	43.2	2161	0%	C	24.2	1802	0%
17. Oak Street /Washington Street/Tremont Street (Route 140)	C	26.9	1924	0%	D	41.1	2403	0%	C	25.2	1933	0%
18. Cohannet Street (Route 140) / Weir Street (Route 138)	B	11.9	2444	0%	A	9.8	2923	0%	B	10.9	2797	0%
22. High Street/Winthrop Street (Route 140)	C	21.7	1530	0%	F	81.1	2124	0%	C	34.1	1783	0%
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	C	21.8	1789	0%	C	29.7	1900	0%	C	24.6	1973	0%
33. County Street (Route 140)/Riverway Ext.	C	30.9	1853	0%	C	21.5	2004	0%	B	17.2	1747	0%
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	D	43.6	3119	0%	D	53.9	3803	0%	D	41.1	3378	0%
35. Winthrop Street (Route 44)/Highland Street	C	20.6	1322	0%	D	45.5	1379	0%	C	25.1	1696	0%
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	B	17.6	1398	0%	D	41.9	1757	0%	B	10.1	1273	0%
47. Cape Highway (Route 44)/Church Street	B	13.3	1861	0%	C	20.4	2473	0%	B	13.3	2246	0%
49. Cape Highway (Route 44)/Orchard Street	E	54.2	3208	0%	F	153.0	4370	0%	E	63.7	3894	0%
50. Broadway (Route 138)/I-495 NB Ramps	B	12.7	2453	0%	D	54.3	2849	0%	B	12.2	1983	0%
51. Broadway (Route 138)/I-495 SB Ramps	C	21.2	2510	0%	B	14.2	3058	0%	B	11.8	2113	0%
52. Pleasant Street (Route 104)/Route 24 NB Ramps	A	4.6	2590	0%	A	4.2	2793	0%	A	2.9	2157	0%
53. Pleasant Street (Route 104)/Route 24 SB Ramps	A	7.5	1726	0%	B	13.3	2256	0%	B	10.8	1546	0%
4: O'Connell Way & Stevens Street	*B*	*14.3*	*1115*	5%	*C*	*32.5*	*2265*	56%	*B*	*12.9*	*1233*	38%
7: Middleboro Avenue & Stevens Street	A	2.8	973	0%	A	7.6	1077	0%	A	3.9	924	0%
8: Hart Street & Poole Street	D	150	1303	0%	D	78.5	1247	0%	D	20.3	1075	0%
10: Hess Station & County Street (Route 140)	C	7.2	1929	0%	D	8.4	2455	0%	C	1.5	2240	0%
13: Galleria Mall Drive South & Galleria Mall Drive	A	7.1	150	0%	A	9	1085	0%	A	10	1249	0%
14: Exeter Street & Broadway (Route 138)	G	80	1588	0%	H	80	1836	0%	F	80	1551	0%
16: Driveway & Washington Street	F	136.6	1896	0%	H	150	2434	0%	F	60.4	1883	0%
19: Court Street & Broadway (Route 138)	A	3.4	1743	0%	C	5.1	2163	0%	C	4.3	2044	0%
20: Post Office Square & Court Street	A	15	1314	0%	B	43.7	1902	0%	B	45.8	1704	0%
21: Cohannet Street & Western Green	B	15	1494	0%	D	35	1914	0%	C	25	1914	0%
24: Summer Street (Route 140) & Ingell Street	F	30.3	1528	0%	G	60	1639	0%	E	14.1	1409	0%
25: County Street (Route 140) & Johnson Street	B	3.1	1608	0%	C	2	1912	0%	C	2.9	1786	0%
26: Myricks Street & Route 79 NB Ramp	B	4	1016	0%	D	3.4	1261	0%	B	2.6	991	0%
27: Myricks Street & Route 79 SB Ramp	A	4.2	787	0%	B	37.5	1117	0%	A	7.1	825	0%
28: Middleboro Avenue & Old Colony Avenue	B	40.2	1024	0%	E	150	1355	0%	C	109.1	1162	0%
29: Pinehill Road & Middleboro Avenue	D	27.2	1163	0%	E	49.1	1283	0%	C	19.5	1040	0%
30: Pinehill Road & Stevens Street	A	4.4	596	0%	A	5.7	769	0%	A	4.3	545	0%
31: Cohannet Street & F.R. Martin Parkway (Route 140)	A	11.1	689	0%	D	58.4	1216	0%	B	13.3	833	0%
32: Gordon Owen Parkway & Williams Street	E	150	1406	0%	F	150	1574	0%	E	63.4	1316	0%
36: Secondary Driveway & Stevens Street	A	0.6	526		A	4.0	997		A	1.8	597	
37: 495 NB Ramp & Route 105	C	150	1890	0%	B	3.1	1965	0%	B	5.3	1687	0%
38: 495 SB Ramp & Route 105	A	10.3	1409	0%	C	22.4	1967	0%	A	15.2	1504	0%
40: Taunton Street & Route 18	B	5	1105	0%	B	5.6	1281	0%	A	3.4	1011	0%
41: 495 NB Ramp & Route 18	B	5.1	1315	0%	B	2	1427	0%	A	2.2	1065	0%
42: 495 SB Ramp & Route 18	C	3.8	1331	0%	D	150	1871	0%	A	3	1127	0%
44: Route 44 & 495 NB Ramp	H	15.3	2714	0%	H	5.2	2686	0%	H	7.2	2722	0%
45: Route 44 & 495 SB Ramp	E	142.8	2301	0%	F	150	2550	0%	E	57.6	2390	0%
46: Route 44 & Richmond Street	D	5.5	1723	0%	H	46.7	2144	0%	E	9.6	1984	0%
48: Route 44 & Hill Street	D	5.6	1916	0%	F	11.4	2343	0%	G	19.7	2272	0%
54: Paddleford Street & Route 24 NB Ramp	A	2.3	674	0%	A	2.3	642	0%	A	1.7	615	0%
55: Paddleford Street & Route 24 SB Ramp	A	2.4	688	0%	A	6.5	940	0%	A	4.7	766	0%
58: Middleboro Avenue & Waterpark Driveway												

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Light Blue – Volume increase > 10%
Yellow – Unsignalized intersection with delay > 150s. Capped at 150s
Gold – Unsignalized intersection with missing delay. Assigned value based on HCM LOS
A – 10s
B – 15s
C – 25s
D – 35s
E – 50 s
F or worse – 80s
Orange with italic font – Signal Added in Build or Build with Mitigation Scenario
Pink – Not analyzed or calculated.

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project
2012 Existing

K Factor	10%	factors peak hour vehicle volumes to daily volumes
Peak hr delay to daily Factor (8hr/day)	33%	Factors peak hour delay to daily delay
Daily delay to annual Factor (6 days/wk, 52 wk/yr)	85%	factors peak daily delay to annual delay

Intersection	Average Peak Delay time (s)	Traffic Volume (adt)	Idle MOBILE6 VOC (g/hr)	VOC (lb/day)	VOC (tpy)	Idle MOBILE6 NOX (g/hr)	NOX (lb/day)	NOX (tpy)	Idle MOBILE6 CO2 (g/hr)	CO2 (lb/day)	CO2 (tpy)
2. Galleria Mall Drive South/County Street	5.77	14590	5.530	0.09	0.01	3.398	0.06	0.009	1403.250	24.10	3.760
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	11.93	14200	5.530	0.19	0.03	3.398	0.12	0.018	1403.250	48.54	7.572
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	4.03	42090	5.530	0.19	0.03	3.398	0.12	0.018	1403.250	48.63	7.586
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	27.60	38430	5.530	1.20	0.19	3.398	0.74	0.115	1403.250	303.83	47.397
9. Mozzone Boulevard/County Street (Route 140)	10.03	24850	5.530	0.28	0.04	3.398	0.17	0.027	1403.250	71.42	11.142
11. Erika Drive/County Street (Route 140)	21.93	27880	5.530	0.69	0.11	3.398	0.42	0.066	1403.250	175.16	27.326
12. Hart Street/County Street (Route 140)	82.07	28930	5.530	2.68	0.42	3.398	1.65	0.257	1403.250	680.08	106.093
15. Washington Street/Broadway (Route 138)	33.13	20320	5.530	0.76	0.12	3.398	0.47	0.073	1403.250	192.86	30.086
17. Oak Street /Washington Street/Tremont Street (Route 140)	35.60	22580	5.530	0.91	0.14	3.398	0.56	0.087	1403.250	230.26	35.921
18. Cohannet Street (Route 140) / Weir Street (Route 138)	10.30	27450	5.530	0.32	0.05	3.398	0.20	0.031	1403.250	80.99	12.634
22. High Street/Winthrop Street (Route 140)	43.90	19890	5.530	0.99	0.15	3.398	0.61	0.094	1403.250	250.12	39.019
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	23.60	18530	5.530	0.49	0.08	3.398	0.30	0.047	1403.250	125.27	19.542
33. County Street (Route 140)/Riverway Ext.	27.50	18590	5.530	0.58	0.09	3.398	0.35	0.055	1403.250	146.44	22.845
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	48.07	35070	5.530	1.90	0.30	3.398	1.17	0.182	1403.250	482.87	75.327
35. Winthrop Street (Route 44)/Highland Street	29.30	17650	5.530	0.58	0.09	3.398	0.36	0.056	1403.250	148.14	23.109
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	22.23	16230	5.530	0.41	0.06	3.398	0.25	0.039	1403.250	103.36	16.125
47. Cape Highway (Route 44)/Church Street	16.20	22970	5.530	0.42	0.07	3.398	0.26	0.040	1403.250	106.59	16.628
49. Cape Highway (Route 44)/Orchard Street	79.30	40840	5.530	3.66	0.57	3.398	2.25	0.350	1403.250	927.70	144.721
50. Broadway (Route 138)/I-495 NB Ramps	19.27	26830	5.530	0.58	0.09	3.398	0.36	0.056	1403.250	148.07	23.099
51. Broadway (Route 138)/I-495 SB Ramps	15.00	28800	5.530	0.49	0.08	3.398	0.30	0.047	1403.250	123.75	19.304
52. Pleasant Street (Route 104)/Route 24 NB Ramps	3.80	26200	5.530	0.11	0.02	3.398	0.07	0.011	1403.250	28.52	4.449
53. Pleasant Street (Route 104)/Route 24 SB Ramps	10.67	21250	5.530	0.26	0.04	3.398	0.16	0.025	1403.250	64.93	10.129
4: O'Connell Way & Stevens Street	12.77	11010	5.530	0.16	0.02	3.398	0.10	0.015	1403.250	40.26	6.281
7: Middleboro Avenue & Stevens Street	4.33	9870	5.530	0.05	0.01	3.398	0.03	0.005	1403.250	12.25	1.911
8: Hart Street & Poole Street	79.53	11950	5.530	1.07	0.17	3.398	0.66	0.103	1403.250	272.25	42.471
10: Hess Station & County Street (Route 140)	14.60	23020	5.530	0.38	0.06	3.398	0.23	0.036	1403.250	96.27	15.019
13: Galleria Mall Drive South & Galleria Mall Drive	8.47	11760	5.530	0.11	0.02	3.398	0.07	0.011	1403.250	28.52	4.449
14: Exeter Street & Broadway (Route 138)	80.00	17270	5.530	1.56	0.24	3.398	0.96	0.149	1403.250	395.76	61.738
16: Driveway & Washington Street	126.53	22850	5.530	3.26	0.51	3.398	2.01	0.313	1403.250	828.21	129.200
19: Court Street & Broadway (Route 138)	4.13	20280	5.530	0.09	0.01	3.398	0.06	0.009	1403.250	24.01	3.746
20: Post Office Square & Court Street	29.57	17850	5.530	0.60	0.09	3.398	0.37	0.057	1403.250	151.18	23.584
21: Cohannet Street & Western Green	21.67	17960	5.530	0.44	0.07	3.398	0.27	0.042	1403.250	111.47	17.389
24: Summer Street (Route 140) & Ingell Street	36.73	15260	5.530	0.63	0.10	3.398	0.39	0.061	1403.250	160.57	25.049
25: County Street (Route 140) & Johnson Street	1.97	16990	5.530	0.04	0.01	3.398	0.02	0.004	1403.250	9.57	1.493
26: Myricks Street & Route 79 NB Ramp	3.60	11090	5.530	0.05	0.01	3.398	0.03	0.004	1403.250	11.44	1.784
27: Myricks Street & Route 79 SB Ramp	13.87	10230	5.530	0.16	0.02	3.398	0.10	0.015	1403.250	40.63	6.339
28: Middleboro Avenue & Old Colony Avenue	131.13	12650	5.530	1.87	0.29	3.398	1.15	0.179	1403.250	475.17	74.127
29: Pinehill Road & Middleboro Avenue	51.83	11940	5.530	0.70	0.11	3.398	0.43	0.067	1403.250	177.28	27.656
30: Pinehill Road & Stevens Street	4.63	6840	5.530	0.04	0.01	3.398	0.02	0.003	1403.250	9.08	1.416
31: Cohannet Street & F.R. Martin Parkway (Route 140)	22.00	11400	5.530	0.28	0.04	3.398	0.17	0.027	1403.250	71.84	11.207
32: Gordon Owen Parkway & Williams Street	89.33	14730	5.530	1.49	0.23	3.398	0.91	0.142	1403.250	376.93	58.802
36: Secondary Driveway & Stevens Street	0.00	1	5.530	0.00	0.00	3.398	0.00	0.000	1403.250	0.00	0.000
37: 495 NB Ramp & Route 105	52.90	18260	5.530	1.09	0.17	3.398	0.67	0.105	1403.250	276.70	43.165
38: 495 SB Ramp & Route 105	16.80	18180	5.530	0.34	0.05	3.398	0.21	0.033	1403.250	87.49	13.648
40: Taunton Street & Route 18	6.50	12080	5.530	0.09	0.01	3.398	0.05	0.008	1403.250	22.49	3.509
41: 495 NB Ramp & Route 18	3.07	13430	5.530	0.05	0.01	3.398	0.03	0.004	1403.250	11.80	1.840
42: 495 SB Ramp & Route 18	35.40	17620	5.530	0.70	0.11	3.398	0.43	0.067	1403.250	178.67	27.873
44: Route 44 & 495 NB Ramp	8.53	25390	5.530	0.24	0.04	3.398	0.15	0.023	1403.250	62.06	9.682
45: Route 44 & 495 SB Ramp	92.00	23690	5.530	2.46	0.38	3.398	1.51	0.236	1403.250	624.31	97.392
46: Route 44 & Richmond Street	26.07	19870	5.530	0.58	0.09	3.398	0.36	0.056	1403.250	148.36	23.145
48: Route 44 & Hill Street	20.33	21740	5.530	0.50	0.08	3.398	0.31	0.048	1403.250	126.62	19.753
54: Paddleford Street & Route 24 NB Ramp	2.33	6350	5.530	0.02	0.00	3.398	0.01	0.002	1403.250	4.24	0.662
55: Paddleford Street & Route 24 SB Ramp	4.53	8830	5.530	0.05	0.01	3.398	0.03	0.004	1403.250	11.47	1.789
58: Middleboro Avenue & Waterpark Driveway	0.00	1	5.530	0.00	0.00	3.398	0.00	0.000	1403.250	0.00	0.000
Totals	hrs	3025.078		36.88	5.75		22.66	3.53		9358.54	1459.93

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project
2022 No-Action

K Factor	10%	factors peak hour vehicle volumes to daily volumes
Peak hr delay to daily Factor (8hr/day)	33%	Factors peak hour delay to daily delay
Daily delay to annual Factor (6 days/wk, 52 wk/yr)	85%	factors peak daily delay to annual delay

Intersection	Average Peak Delay time (s)	Traffic Volume (adt)	Idle MOBILE6 VOC (g/hr)	VOC (lb/day)	VOC (tpy)	Idle MOBILE6 NOX (g/hr)	NOX (lb/day)	NOX (tpy)	Idle MOBILE6 CO2 (g/hr)	CO2 (lb/day)	CO2 (tpy)
2. Galleria Mall Drive South/County Street	5.53	16300	3.580	0.07	0.01	1.065	0.02	0.003	1423.400	26.21	4.088
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	13.83	17620	3.580	0.18	0.03	1.065	0.05	0.008	1423.400	70.82	11.048
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	4.40	46550	3.580	0.15	0.02	1.065	0.04	0.007	1423.400	59.51	9.284
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	42.80	41440	3.580	1.30	0.20	1.065	0.39	0.060	1423.400	515.35	80.395
9. Mozzone Boulevard/County Street (Route 140)	13.20	26470	3.580	0.26	0.04	1.065	0.08	0.012	1423.400	101.52	15.838
11. Erika Drive/County Street (Route 140)	21.80	29690	3.580	0.47	0.07	1.065	0.14	0.022	1423.400	188.06	29.338
12. Hart Street/County Street (Route 140)	35.93	30730	3.580	0.81	0.13	1.065	0.24	0.037	1423.400	320.85	50.052
15. Washington Street/Broadway (Route 138)	31.07	21610	3.580	0.49	0.08	1.065	0.15	0.023	1423.400	195.07	30.431
17. Oak Street /Washington Street/Tremont Street (Route 140)	31.07	24030	3.580	0.55	0.09	1.065	0.16	0.025	1423.400	216.91	33.839
18. Cohannet Street (Route 140) / Weir Street (Route 138)	10.87	29230	3.580	0.23	0.04	1.065	0.07	0.011	1423.400	92.29	14.398
22. High Street/Winthrop Street (Route 140)	45.63	21240	3.580	0.71	0.11	1.065	0.21	0.033	1423.400	281.63	43.934
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	25.37	19730	3.580	0.37	0.06	1.065	0.11	0.017	1423.400	145.42	22.686
33. County Street (Route 140)/Riverway Ext.	23.20	20040	3.580	0.34	0.05	1.065	0.10	0.016	1423.400	135.09	21.074
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	46.20	38030	3.580	1.28	0.20	1.065	0.38	0.060	1423.400	510.51	79.640
35. Winthrop Street (Route 44)/Highland Street	30.40	16960	3.580	0.38	0.06	1.065	0.11	0.017	1423.400	149.81	23.370
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	23.20	17570	3.580	0.30	0.05	1.065	0.09	0.014	1423.400	118.44	18.477
47. Cape Highway (Route 44)/Church Street	15.67	24730	3.580	0.28	0.04	1.065	0.08	0.013	1423.400	112.57	17.562
49. Cape Highway (Route 44)/Orchard Street	90.30	43700	3.580	2.88	0.45	1.065	0.86	0.134	1423.400	1146.59	178.868
50. Broadway (Route 138)/I-495 NB Ramps	26.40	28490	3.580	0.55	0.09	1.065	0.16	0.026	1423.400	218.54	34.093
51. Broadway (Route 138)/I-495 SB Ramps	15.73	30580	3.580	0.35	0.05	1.065	0.10	0.016	1423.400	139.80	21.808
52. Pleasant Street (Route 104)/Route 24 NB Ramps	3.90	27930	3.580	0.08	0.01	1.065	0.02	0.004	1423.400	31.65	4.937
53. Pleasant Street (Route 104)/Route 24 SB Ramps	10.53	22560	3.580	0.17	0.03	1.065	0.05	0.008	1423.400	69.05	10.771
4: O'Connell Way & Stevens Street	54.50	14560	3.580	0.58	0.09	1.065	0.17	0.027	1423.400	230.57	35.968
7: Middleboro Avenue & Stevens Street	4.77	10770	3.580	0.04	0.01	1.065	0.01	0.002	1423.400	14.92	2.327
8: Hart Street & Poole Street	82.93	13030	3.580	0.79	0.12	1.065	0.23	0.037	1423.400	313.99	48.982
10: Hess Station & County Street (Route 140)	5.70	24550	3.580	0.10	0.02	1.065	0.03	0.005	1423.400	40.66	6.343
13: Galleria Mall Drive South & Galleria Mall Drive	8.70	12490	3.580	0.08	0.01	1.065	0.02	0.004	1423.400	31.57	4.925
14: Exeter Street & Broadway (Route 138)	80.00	18360	3.580	1.07	0.17	1.065	0.32	0.050	1423.400	426.78	66.577
16: Driveway & Washington Street	115.67	24340	3.580	2.06	0.32	1.065	0.61	0.095	1423.400	818.03	127.612
19: Court Street & Broadway (Route 138)	4.27	21630	3.580	0.07	0.01	1.065	0.02	0.003	1423.400	26.82	4.183
20: Post Office Square & Court Street	34.83	19020	3.580	0.48	0.08	1.065	0.14	0.022	1423.400	192.51	30.031
21: Cohannet Street & Western Green	25.00	19140	3.580	0.35	0.05	1.065	0.10	0.016	1423.400	139.03	21.689
24: Summer Street (Route 140) & Ingell Street	34.80	16390	3.580	0.42	0.07	1.065	0.12	0.019	1423.400	165.73	25.854
25: County Street (Route 140) & Johnson Street	2.67	19120	3.580	0.04	0.01	1.065	0.01	0.002	1423.400	14.81	2.311
26: Myricks Street & Route 79 NB Ramp	3.33	12610	3.580	0.03	0.00	1.065	0.01	0.001	1423.400	12.21	1.905
27: Myricks Street & Route 79 SB Ramp	16.27	11170	3.580	0.13	0.02	1.065	0.04	0.006	1423.400	52.79	8.236
28: Middleboro Avenue & Old Colony Avenue	99.77	13550	3.580	0.99	0.15	1.065	0.29	0.046	1423.400	392.79	61.276
29: Pinehill Road & Middleboro Avenue	31.93	12830	3.580	0.30	0.05	1.065	0.09	0.014	1423.400	119.04	18.571
30: Pinehill Road & Stevens Street	4.80	7690	3.580	0.03	0.00	1.065	0.01	0.001	1423.400	10.73	1.673
31: Cohannet Street & F.R. Martin Parkway (Route 140)	27.60	12160	3.580	0.25	0.04	1.065	0.07	0.011	1423.400	97.52	15.213
32: Gordon Owen Parkway & Williams Street	121.13	15740	3.580	1.39	0.22	1.065	0.41	0.065	1423.400	554.00	86.424
36: Secondary Driveway & Stevens Street	0.00	1	3.580	0.00	0.00	1.065	0.00	0.000	1423.400	0.00	0.000
37: 495 NB Ramp & Route 105	52.80	19650	3.580	0.76	0.12	1.065	0.23	0.035	1423.400	301.46	47.028
38: 495 SB Ramp & Route 105	15.97	19670	3.580	0.23	0.04	1.065	0.07	0.011	1423.400	91.26	14.236
40: Taunton Street & Route 18	4.67	12810	3.580	0.04	0.01	1.065	0.01	0.002	1423.400	17.37	2.710
41: 495 NB Ramp & Route 18	3.10	14270	3.580	0.03	0.01	1.065	0.01	0.002	1423.400	12.85	2.005
42: 495 SB Ramp & Route 18	52.27	18710	3.580	0.71	0.11	1.065	0.21	0.033	1423.400	284.14	44.326
44: Route 44 & 495 NB Ramp	9.23	27220	3.580	0.18	0.03	1.065	0.05	0.009	1423.400	73.03	11.392
45: Route 44 & 495 SB Ramp	116.80	25500	3.580	2.18	0.34	1.065	0.65	0.101	1423.400	865.41	135.004
46: Route 44 & Richmond Street	20.60	21440	3.580	0.32	0.05	1.065	0.10	0.015	1423.400	128.33	20.020
48: Route 44 & Hill Street	12.23	23430	3.580	0.21	0.03	1.065	0.06	0.010	1423.400	83.28	12.992
54: Paddleford Street & Route 24 NB Ramp	2.10	6740	3.580	0.01	0.00	1.065	0.00	0.000	1423.400	4.11	0.642
55: Paddleford Street & Route 24 SB Ramp	4.53	9400	3.580	0.03	0.00	1.065	0.01	0.001	1423.400	12.38	1.932
58: Middleboro Avenue & Waterpark Driveway	0.00	1	3.580	0.00	0.00	1.065	0.00	0.000	1423.400	0.00	0.000
Totals	hrs	3305.799		26.09	4.07		7.76	1.21		10373.85	1618.32

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project
2022 Alternative A

K Factor	10%	factors peak hour vehicle volumes to daily volumes
Peak hr delay to daily Factor (8hr/day)	33%	Factors peak hour delay to daily delay
Daily delay to annual Factor (6 days/wk, 52 wk/yr)	85%	factors peak daily delay to annual delay

Intersection	Average Peak Delay time (s)	Traffic Volume (adt)	Idle MOBILE6 VOC (g/hr)	VOC (lb/day)	VOC (tpy)	Idle MOBILE6 NOX (g/hr)	NOX (lb/day)	NOX (tpy)	Idle MOBILE6 CO2 (g/hr)	CO2 (lb/day)	CO2 (tpy)
2. Galleria Mall Drive South/County Street	4.77	23980	3.580	0.08	0.01	1.065	0.02	0.004	1423.400	33.21	5.181
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	70.43	31550	3.580	1.62	0.25	1.065	0.48	0.075	1423.400	645.68	100.726
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	6.43	56960	3.580	0.27	0.04	1.065	0.08	0.012	1423.400	106.47	16.610
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	54.33	48220	3.580	1.91	0.30	1.065	0.57	0.089	1423.400	761.26	118.757
9. Mozzone Boulevard/County Street (Route 140)	15.10	27350	3.580	0.30	0.05	1.065	0.09	0.014	1423.400	120.00	18.720
11. Erika Drive/County Street (Route 140)	22.13	30100	3.580	0.49	0.08	1.065	0.14	0.023	1423.400	193.58	30.198
12. Hart Street/County Street (Route 140)	36.97	31840	3.580	0.86	0.13	1.065	0.26	0.040	1423.400	342.00	53.352
15. Washington Street/Broadway (Route 138)	31.07	21750	3.580	0.49	0.08	1.065	0.15	0.023	1423.400	196.33	30.628
17. Oak Street /Washington Street/Tremont Street (Route 140)	30.63	24210	3.580	0.54	0.08	1.065	0.16	0.025	1423.400	215.49	33.617
18. Cohannet Street (Route 140) / Weir Street (Route 138)	10.97	29550	3.580	0.24	0.04	1.065	0.07	0.011	1423.400	94.16	14.689
22. High Street/Winthrop Street (Route 140)	50.87	21770	3.580	0.81	0.13	1.065	0.24	0.038	1423.400	321.76	50.194
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	25.30	19880	3.580	0.37	0.06	1.065	0.11	0.017	1423.400	146.14	22.798
33. County Street (Route 140)/Riverway Ext.	25.63	21080	3.580	0.39	0.06	1.065	0.12	0.018	1423.400	157.01	24.493
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	46.50	38210	3.580	1.30	0.20	1.065	0.39	0.060	1423.400	516.26	80.537
35. Winthrop Street (Route 44)/Highland Street	32.00	19320	3.580	0.45	0.07	1.065	0.13	0.021	1423.400	179.64	28.023
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	26.27	18620	3.580	0.36	0.06	1.065	0.11	0.017	1423.400	142.11	22.169
47. Cape Highway (Route 44)/Church Street	17.13	25780	3.580	0.32	0.05	1.065	0.10	0.015	1423.400	128.34	20.021
49. Cape Highway (Route 44)/Orchard Street	114.03	44760	3.580	3.73	0.58	1.065	1.11	0.173	1423.400	1483.07	231.359
50. Broadway (Route 138)/I-495 NB Ramps	26.40	28490	3.580	0.55	0.09	1.065	0.16	0.026	1423.400	218.54	34.093
51. Broadway (Route 138)/I-495 SB Ramps	15.73	30580	3.580	0.35	0.05	1.065	0.10	0.016	1423.400	139.80	21.808
52. Pleasant Street (Route 104)/Route 24 NB Ramps	3.87	28170	3.580	0.08	0.01	1.065	0.02	0.004	1423.400	31.65	4.937
53. Pleasant Street (Route 104)/Route 24 SB Ramps	10.50	22710	3.580	0.17	0.03	1.065	0.05	0.008	1423.400	69.29	10.809
4: O'Connell Way & Stevens Street	79.17	28480	3.580	1.65	0.26	1.065	0.49	0.076	1423.400	655.12	102.199
7: Middleboro Avenue & Stevens Street	5.43	11130	3.580	0.04	0.01	1.065	0.01	0.002	1423.400	17.57	2.741
8: Hart Street & Poole Street	88.03	12880	3.580	0.83	0.13	1.065	0.25	0.038	1423.400	329.46	51.396
10: Hess Station & County Street (Route 140)	6.57	25430	3.580	0.12	0.02	1.065	0.04	0.006	1423.400	48.52	7.569
13: Galleria Mall Drive South & Galleria Mall Drive	8.70	12490	3.580	0.08	0.01	1.065	0.02	0.004	1423.400	31.57	4.925
14: Exeter Street & Broadway (Route 138)	80.00	18520	3.580	1.08	0.17	1.065	0.32	0.050	1423.400	430.50	67.158
16: Driveway & Washington Street	116.90	24530	3.580	2.10	0.33	1.065	0.62	0.097	1423.400	833.20	129.980
19: Court Street & Broadway (Route 138)	4.27	21840	3.580	0.07	0.01	1.065	0.02	0.003	1423.400	27.08	4.224
20: Post Office Square & Court Street	36.20	19180	3.580	0.51	0.08	1.065	0.15	0.024	1423.400	201.74	31.472
21: Cohannet Street & Western Green	25.00	19400	3.580	0.35	0.06	1.065	0.11	0.016	1423.400	140.92	21.984
24: Summer Street (Route 140) & Ingell Street	50.00	18060	3.580	0.66	0.10	1.065	0.20	0.031	1423.400	262.38	40.931
25: County Street (Route 140) & Johnson Street	3.10	20240	3.580	0.05	0.01	1.065	0.01	0.002	1423.400	18.23	2.844
26: Myricks Street & Route 79 NB Ramp	3.33	12990	3.580	0.03	0.00	1.065	0.01	0.001	1423.400	12.58	1.963
27: Myricks Street & Route 79 SB Ramp	27.83	11520	3.580	0.23	0.04	1.065	0.07	0.011	1423.400	93.17	14.534
28: Middleboro Avenue & Old Colony Avenue	104.70	13520	3.580	1.03	0.16	1.065	0.31	0.048	1423.400	411.30	64.163
29: Pinehill Road & Middleboro Avenue	35.30	13200	3.580	0.34	0.05	1.065	0.10	0.016	1423.400	135.39	21.121
30: Pinehill Road & Stevens Street	5.13	8420	3.580	0.03	0.00	1.065	0.01	0.001	1423.400	12.56	1.959
31: Cohannet Street & F.R. Martin Parkway (Route 140)	30.90	12340	3.580	0.28	0.04	1.065	0.08	0.013	1423.400	110.79	17.284
32: Gordon Owen Parkway & Williams Street	121.80	15920	3.580	1.42	0.22	1.065	0.42	0.066	1423.400	563.42	87.893
36: Secondary Driveway & Stevens Street	0.97	10150	3.580	0.01	0.00	1.065	0.00	0.000	1423.400	2.85	0.445
37: 495 NB Ramp & Route 105	54.23	20430	3.580	0.81	0.13	1.065	0.24	0.038	1423.400	321.94	50.223
38: 495 SB Ramp & Route 105	25.30	20720	3.580	0.38	0.06	1.065	0.11	0.018	1423.400	152.32	23.762
40: Taunton Street & Route 18	4.67	12810	3.580	0.04	0.01	1.065	0.01	0.002	1423.400	17.37	2.710
41: 495 NB Ramp & Route 18	3.10	14270	3.580	0.03	0.01	1.065	0.01	0.002	1423.400	12.85	2.005
42: 495 SB Ramp & Route 18	52.27	18710	3.580	0.71	0.11	1.065	0.21	0.033	1423.400	284.14	44.326
44: Route 44 & 495 NB Ramp	9.57	27910	3.580	0.20	0.03	1.065	0.06	0.009	1423.400	77.58	12.103
45: Route 44 & 495 SB Ramp	107.30	26000	3.580	2.04	0.32	1.065	0.61	0.095	1423.400	810.61	126.455
46: Route 44 & Richmond Street	24.73	22490	3.580	0.41	0.06	1.065	0.12	0.019	1423.400	161.63	25.214
48: Route 44 & Hill Street	14.23	24480	3.580	0.25	0.04	1.065	0.08	0.012	1423.400	101.24	15.794
54: Paddleford Street & Route 24 NB Ramp	2.10	6740	3.580	0.01	0.00	1.065	0.00	0.000	1423.400	4.11	0.642
55: Paddleford Street & Route 24 SB Ramp	4.63	9540	3.580	0.03	0.01	1.065	0.01	0.001	1423.400	12.84	2.004
58: Middleboro Avenue & Waterpark Driveway	0.00	10250	3.580	0.00	0.00	1.065	0.00	0.000	1423.400	0.00	0.000
Totals	hrs	3995.056		31.53	4.92		9.38	1.46		12536.79	1955.74

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project
2022 Alternative A Mitigated

K Factor	10%	factors peak hour vehicle volumes to daily volumes
Peak hr delay to daily Factor (8hr/day)	33%	Factors peak hour delay to daily delay
Daily delay to annual Factor (6 days/wk, 52 wk/yr)	85%	factors peak daily delay to annual delay

Intersection	Average Peak Delay time (s)	Traffic Volume (adt)	Idle MOBILE6 VOC (g/hr)	VOC (lb/day)	VOC (tpy)	Idle MOBILE6 NOX (g/hr)	NOX (lb/day)	NOX (tpy)	Idle MOBILE6 CO2 (g/hr)	CO2 (lb/day)	CO2 (tpy)
2. Galleria Mall Drive South/County Street	4.77	23980	3.580	0.08	0.01	1.065	0.02	0.004	1423.400	33.21	5.181
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	22.67	31550	3.580	0.52	0.08	1.065	0.16	0.024	1423.400	207.79	32.415
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	6.60	56960	3.580	0.27	0.04	1.065	0.08	0.013	1423.400	109.23	17.040
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	17.93	48220	3.580	0.63	0.10	1.065	0.19	0.029	1423.400	251.26	39.197
9. Mozzone Boulevard/County Street (Route 140)	9.70	27350	3.580	0.19	0.03	1.065	0.06	0.009	1423.400	77.08	12.025
11. Erika Drive/County Street (Route 140)	26.30	30100	3.580	0.58	0.09	1.065	0.17	0.027	1423.400	230.02	35.883
12. Hart Street/County Street (Route 140)	36.93	31840	3.580	0.86	0.13	1.065	0.26	0.040	1423.400	341.69	53.304
15. Washington Street/Broadway (Route 138)	31.07	21750	3.580	0.49	0.08	1.065	0.15	0.023	1423.400	196.33	30.628
17. Oak Street /Washington Street/Tremont Street (Route 140)	30.60	24210	3.580	0.54	0.08	1.065	0.16	0.025	1423.400	215.26	33.580
18. Cohannet Street (Route 140) / Weir Street (Route 138)	10.97	29550	3.580	0.24	0.04	1.065	0.07	0.011	1423.400	94.16	14.689
22. High Street/Winthrop Street (Route 140)	30.97	21770	3.580	0.49	0.08	1.065	0.15	0.023	1423.400	195.88	30.557
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	25.27	19880	3.580	0.37	0.06	1.065	0.11	0.017	1423.400	145.95	22.768
33. County Street (Route 140)/Riverway Ext.	25.77	21080	3.580	0.40	0.06	1.065	0.12	0.018	1423.400	157.82	24.620
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	46.60	38210	3.580	1.30	0.20	1.065	0.39	0.060	1423.400	517.37	80.710
35. Winthrop Street (Route 44)/Highland Street	26.80	19320	3.580	0.38	0.06	1.065	0.11	0.018	1423.400	150.45	23.470
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	26.23	18620	3.580	0.36	0.06	1.065	0.11	0.017	1423.400	141.93	22.141
47. Cape Highway (Route 44)/Church Street	17.13	25780	3.580	0.32	0.05	1.065	0.10	0.015	1423.400	128.34	20.021
49. Cape Highway (Route 44)/Orchard Street	114.03	44760	3.580	3.73	0.58	1.065	1.11	0.173	1423.400	1483.07	231.359
50. Broadway (Route 138)/I-495 NB Ramps	26.40	28490	3.580	0.55	0.09	1.065	0.16	0.026	1423.400	218.54	34.093
51. Broadway (Route 138)/I-495 SB Ramps	15.73	30580	3.580	0.35	0.05	1.065	0.10	0.016	1423.400	139.80	21.808
52. Pleasant Street (Route 104)/Route 24 NB Ramps	3.87	28170	3.580	0.08	0.01	1.065	0.02	0.004	1423.400	31.65	4.937
53. Pleasant Street (Route 104)/Route 24 SB Ramps	10.50	22710	3.580	0.17	0.03	1.065	0.05	0.008	1423.400	69.29	10.809
4: O'Connell Way & Stevens Street	22.30	27880	3.580	0.45	0.07	1.065	0.14	0.021	1423.400	180.65	28.181
7: Middleboro Avenue & Stevens Street	5.43	11130	3.580	0.04	0.01	1.065	0.01	0.002	1423.400	17.57	2.741
8: Hart Street & Poole Street	88.07	12880	3.580	0.83	0.13	1.065	0.25	0.038	1423.400	329.58	51.415
10: Hess Station & County Street (Route 140)	6.63	25430	3.580	0.12	0.02	1.065	0.04	0.006	1423.400	49.01	7.646
13: Galleria Mall Drive South & Galleria Mall Drive	8.70	12490	3.580	0.08	0.01	1.065	0.02	0.004	1423.400	31.57	4.925
14: Exeter Street & Broadway (Route 138)	80.00	18520	3.580	1.08	0.17	1.065	0.32	0.050	1423.400	430.50	67.158
16: Driveway & Washington Street	116.90	24530	3.580	2.10	0.33	1.065	0.62	0.097	1423.400	833.20	129.980
19: Court Street & Broadway (Route 138)	4.27	21840	3.580	0.07	0.01	1.065	0.02	0.003	1423.400	27.08	4.224
20: Post Office Square & Court Street	36.20	19180	3.580	0.51	0.08	1.065	0.15	0.024	1423.400	201.74	31.472
21: Cohannet Street & Western Green	25.00	19400	3.580	0.35	0.06	1.065	0.11	0.016	1423.400	140.92	21.984
24: Summer Street (Route 140) & Ingell Street	50.00	18060	3.580	0.66	0.10	1.065	0.20	0.031	1423.400	262.38	40.931
25: County Street (Route 140) & Johnson Street	3.10	20240	3.580	0.05	0.01	1.065	0.01	0.002	1423.400	18.23	2.844
26: Myricks Street & Route 79 NB Ramp	3.33	12990	3.580	0.03	0.00	1.065	0.01	0.001	1423.400	12.58	1.963
27: Myricks Street & Route 79 SB Ramp	27.83	11520	3.580	0.23	0.04	1.065	0.07	0.011	1423.400	93.17	14.534
28: Middleboro Avenue & Old Colony Avenue	30.83	13520	3.580	0.30	0.05	1.065	0.09	0.014	1423.400	121.13	18.896
29: Pinehill Road & Middleboro Avenue	18.37	13200	3.580	0.18	0.03	1.065	0.05	0.008	1423.400	70.44	10.989
30: Pinehill Road & Stevens Street	5.13	8420	3.580	0.03	0.00	1.065	0.01	0.001	1423.400	12.56	1.959
31: Cohannet Street & F.R. Martin Parkway (Route 140)	30.90	12340	3.580	0.28	0.04	1.065	0.08	0.013	1423.400	110.79	17.284
32: Gordon Owen Parkway & Williams Street	121.80	15920	3.580	1.42	0.22	1.065	0.42	0.066	1423.400	563.42	87.893
36: Secondary Driveway & Stevens Street	2.33	10260	3.580	0.02	0.00	1.065	0.01	0.001	1423.400	6.96	1.085
37: 495 NB Ramp & Route 105	54.23	20430	3.580	0.81	0.13	1.065	0.24	0.038	1423.400	321.94	50.223
38: 495 SB Ramp & Route 105	25.30	20720	3.580	0.38	0.06	1.065	0.11	0.018	1423.400	152.32	23.762
40: Taunton Street & Route 18	4.67	12810	3.580	0.04	0.01	1.065	0.01	0.002	1423.400	17.37	2.710
41: 495 NB Ramp & Route 18	3.10	14270	3.580	0.03	0.01	1.065	0.01	0.002	1423.400	12.85	2.005
42: 495 SB Ramp & Route 18	52.27	18710	3.580	0.71	0.11	1.065	0.21	0.033	1423.400	284.14	44.326
44: Route 44 & 495 NB Ramp	9.57	27910	3.580	0.20	0.03	1.065	0.06	0.009	1423.400	77.58	12.103
45: Route 44 & 495 SB Ramp	107.30	26000	3.580	2.04	0.32	1.065	0.61	0.095	1423.400	810.61	126.455
46: Route 44 & Richmond Street	24.73	22490	3.580	0.41	0.06	1.065	0.12	0.019	1423.400	161.63	25.214
48: Route 44 & Hill Street	14.23	24480	3.580	0.25	0.04	1.065	0.08	0.012	1423.400	101.24	15.794
54: Paddleford Street & Route 24 NB Ramp	2.10	6740	3.580	0.01	0.00	1.065	0.00	0.000	1423.400	4.11	0.642
55: Paddleford Street & Route 24 SB Ramp	4.63	9540	3.580	0.03	0.01	1.065	0.01	0.001	1423.400	12.84	2.004
58: Middleboro Avenue & Waterpark Driveway	0.00	1	3.580	0.00	0.00	1.065	0.00	0.000	1423.400	0.00	0.000
Totals	hrs	3379.86		26.68	4.16		7.94	1.24		10606.26	1654.58

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project
2022 Alternative B

K Factor	10%	factors peak hour vehicle volumes to daily volumes
Peak hr delay to daily Factor (8hr/day)	33%	Factors peak hour delay to daily delay
Daily delay to annual Factor (6 days/wk, 52 wk/yr)	85%	factors peak daily delay to annual delay

Intersection	Average Peak Delay time (s)	Traffic Volume (adt)	Idle MOBILE6 VOC (g/hr)	VOC (lb/day)	VOC (tpy)	Idle MOBILE6 NOX (g/hr)	NOX (lb/day)	NOX (tpy)	Idle MOBILE6 CO2 (g/hr)	CO2 (lb/day)	CO2 (tpy)
2. Galleria Mall Drive South/County Street	4.97	21010	3.580	0.08	0.01	1.065	0.02	0.004	1423.400	30.32	4.730
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	37.60	26310	3.580	0.72	0.11	1.065	0.22	0.034	1423.400	287.44	44.841
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	5.23	53030	3.580	0.20	0.03	1.065	0.06	0.009	1423.400	80.64	12.580
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	47.77	45580	3.580	1.59	0.25	1.065	0.47	0.074	1423.400	632.61	98.688
9. Mozzone Boulevard/County Street (Route 140)	13.20	26470	3.580	0.26	0.04	1.065	0.08	0.012	1423.400	101.52	15.838
11. Erika Drive/County Street (Route 140)	21.80	29690	3.580	0.47	0.07	1.065	0.14	0.022	1423.400	188.06	29.338
12. Hart Street/County Street (Route 140)	35.93	30730	3.580	0.81	0.13	1.065	0.24	0.037	1423.400	320.85	50.052
15. Washington Street/Broadway (Route 138)	31.07	21610	3.580	0.49	0.08	1.065	0.15	0.023	1423.400	195.07	30.431
17. Oak Street /Washington Street/Tremont Street (Route 140)	31.07	24030	3.580	0.55	0.09	1.065	0.16	0.025	1423.400	216.91	33.839
18. Cohannet Street (Route 140) / Weir Street (Route 138)	10.87	29230	3.580	0.23	0.04	1.065	0.07	0.011	1423.400	92.29	14.398
22. High Street/Winthrop Street (Route 140)	45.63	21240	3.580	0.71	0.11	1.065	0.21	0.033	1423.400	281.63	43.934
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	25.37	19730	3.580	0.37	0.06	1.065	0.11	0.017	1423.400	145.42	22.686
33. County Street (Route 140)/Riverway Ext.	23.20	20040	3.580	0.34	0.05	1.065	0.10	0.016	1423.400	135.09	21.074
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	46.20	38030	3.580	1.28	0.20	1.065	0.38	0.060	1423.400	510.51	79.640
35. Winthrop Street (Route 44)/Highland Street	30.40	16960	3.580	0.38	0.06	1.065	0.11	0.017	1423.400	149.81	23.370
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	23.20	17570	3.580	0.30	0.05	1.065	0.09	0.014	1423.400	118.44	18.477
47. Cape Highway (Route 44)/Church Street	15.67	24730	3.580	0.28	0.04	1.065	0.08	0.013	1423.400	112.57	17.562
49. Cape Highway (Route 44)/Orchard Street	90.30	43700	3.580	2.88	0.45	1.065	0.86	0.134	1423.400	1146.59	178.868
50. Broadway (Route 138)/I-495 NB Ramps	26.40	28490	3.580	0.55	0.09	1.065	0.16	0.026	1423.400	218.54	34.093
51. Broadway (Route 138)/I-495 SB Ramps	15.73	30580	3.580	0.35	0.05	1.065	0.10	0.016	1423.400	139.80	21.808
52. Pleasant Street (Route 104)/Route 24 NB Ramps	3.90	27930	3.580	0.08	0.01	1.065	0.02	0.004	1423.400	31.65	4.937
53. Pleasant Street (Route 104)/Route 24 SB Ramps	10.53	22560	3.580	0.17	0.03	1.065	0.05	0.008	1423.400	69.05	10.771
4: O'Connell Way & Stevens Street	44.97	23250	3.580	0.76	0.12	1.065	0.23	0.035	1423.400	303.78	47.389
7: Middleboro Avenue & Stevens Street	4.77	10770	3.580	0.04	0.01	1.065	0.01	0.002	1423.400	14.92	2.327
8: Hart Street & Poole Street	82.93	13030	3.580	0.79	0.12	1.065	0.23	0.037	1423.400	313.99	48.982
10: Hess Station & County Street (Route 140)	5.70	24550	3.580	0.10	0.02	1.065	0.03	0.005	1423.400	40.66	6.343
13: Galleria Mall Drive South & Galleria Mall Drive	8.70	12490	3.580	0.08	0.01	1.065	0.02	0.004	1423.400	31.57	4.925
14: Exeter Street & Broadway (Route 138)	80.00	18360	3.580	1.07	0.17	1.065	0.32	0.050	1423.400	426.78	66.577
16: Driveway & Washington Street	115.67	24340	3.580	2.06	0.32	1.065	0.61	0.095	1423.400	818.03	127.612
19: Court Street & Broadway (Route 138)	4.27	21630	3.580	0.07	0.01	1.065	0.02	0.003	1423.400	26.82	4.183
20: Post Office Square & Court Street	34.83	19020	3.580	0.48	0.08	1.065	0.14	0.022	1423.400	192.51	30.031
21: Cohannet Street & Western Green	25.00	19140	3.580	0.35	0.05	1.065	0.10	0.016	1423.400	139.03	21.689
24: Summer Street (Route 140) & Ingell Street	34.80	16390	3.580	0.42	0.07	1.065	0.12	0.019	1423.400	165.73	25.854
25: County Street (Route 140) & Johnson Street	2.67	19120	3.580	0.04	0.01	1.065	0.01	0.002	1423.400	14.81	2.311
26: Myricks Street & Route 79 NB Ramp	3.33	12610	3.580	0.03	0.00	1.065	0.01	0.001	1423.400	12.21	1.905
27: Myricks Street & Route 79 SB Ramp	16.27	11170	3.580	0.13	0.02	1.065	0.04	0.006	1423.400	52.79	8.236
28: Middleboro Avenue & Old Colony Avenue	99.77	13550	3.580	0.99	0.15	1.065	0.29	0.046	1423.400	392.79	61.276
29: Pinehill Road & Middleboro Avenue	31.93	12830	3.580	0.30	0.05	1.065	0.09	0.014	1423.400	119.04	18.571
30: Pinehill Road & Stevens Street	4.80	7690	3.580	0.03	0.00	1.065	0.01	0.001	1423.400	10.73	1.673
31: Cohannet Street & F.R. Martin Parkway (Route 140)	27.60	12160	3.580	0.25	0.04	1.065	0.07	0.011	1423.400	97.52	15.213
32: Gordon Owen Parkway & Williams Street	121.13	15740	3.580	1.39	0.22	1.065	0.41	0.065	1423.400	554.00	86.424
36: Secondary Driveway & Stevens Street	0.90	9960	3.580	0.01	0.00	1.065	0.00	0.000	1423.400	2.60	0.406
37: 495 NB Ramp & Route 105	52.80	19650	3.580	0.76	0.12	1.065	0.23	0.035	1423.400	301.46	47.028
38: 495 SB Ramp & Route 105	15.97	19670	3.580	0.23	0.04	1.065	0.07	0.011	1423.400	91.26	14.236
40: Taunton Street & Route 18	4.67	12810	3.580	0.04	0.01	1.065	0.01	0.002	1423.400	17.37	2.710
41: 495 NB Ramp & Route 18	3.10	14270	3.580	0.03	0.01	1.065	0.01	0.002	1423.400	12.85	2.005
42: 495 SB Ramp & Route 18	52.27	18710	3.580	0.71	0.11	1.065	0.21	0.033	1423.400	284.14	44.326
44: Route 44 & 495 NB Ramp	9.23	27220	3.580	0.18	0.03	1.065	0.05	0.009	1423.400	73.03	11.392
45: Route 44 & 495 SB Ramp	116.80	25500	3.580	2.18	0.34	1.065	0.65	0.101	1423.400	865.41	135.004
46: Route 44 & Richmond Street	20.60	21440	3.580	0.32	0.05	1.065	0.10	0.015	1423.400	128.33	20.020
48: Route 44 & Hill Street	12.23	23430	3.580	0.21	0.03	1.065	0.06	0.010	1423.400	83.28	12.992
54: Paddleford Street & Route 24 NB Ramp	2.10	6740	3.580	0.01	0.00	1.065	0.00	0.000	1423.400	4.11	0.642
55: Paddleford Street & Route 24 SB Ramp	4.53	9400	3.580	0.03	0.00	1.065	0.01	0.001	1423.400	12.38	1.932
58: Middleboro Avenue & Waterpark Driveway	0.00	1	3.580	0.00	0.00	1.065	0.00	0.000	1423.400	0.00	0.000
Totals	hrs	3444.397		27.19	4.24		8.09	1.26		10808.78	1686.17

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project
2022 Alt B with Mitigation

K Factor	10%	factors peak hour vehicle volumes to daily volumes
Peak hr delay to daily Factor (8hr/day)	33%	Factors peak hour delay to daily delay
Daily delay to annual Factor (6 days/wk, 52 wk/yr)	85%	factors peak daily delay to annual delay

Intersection	Average Peak Delay time (s)	Traffic Volume (adt)	Idle MOBILE6 VOC (g/hr)	VOC (lb/day)	VOC (tpy)	Idle MOBILE6 NOX (g/hr)	NOX (lb/day)	NOX (tpy)	Idle MOBILE6 CO2 (g/hr)	CO2 (lb/day)	CO2 (tpy)
2. Galleria Mall Drive South/County Street	4.97	21010	3.580	0.08	0.01	1.065	0.02	0.004	1423.400	30.32	4.730
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	23.50	26310	3.580	0.45	0.07	1.065	0.13	0.021	1423.400	179.65	28.025
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	5.23	53030	3.580	0.20	0.03	1.065	0.06	0.009	1423.400	80.64	12.580
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	21.03	45580	3.580	0.70	0.11	1.065	0.21	0.033	1423.400	278.56	43.456
9. Mozzone Boulevard/County Street (Route 140)	13.20	26470	3.580	0.26	0.04	1.065	0.08	0.012	1423.400	101.52	15.838
11. Erika Drive/County Street (Route 140)	21.80	29690	3.580	0.47	0.07	1.065	0.14	0.022	1423.400	188.06	29.338
12. Hart Street/County Street (Route 140)	35.93	30730	3.580	0.81	0.13	1.065	0.24	0.037	1423.400	320.85	50.052
15. Washington Street/Broadway (Route 138)	31.07	21610	3.580	0.49	0.08	1.065	0.15	0.023	1423.400	195.07	30.431
17. Oak Street /Washington Street/Tremont Street (Route 140)	31.07	24030	3.580	0.55	0.09	1.065	0.16	0.025	1423.400	216.91	33.839
18. Cohannet Street (Route 140) / Weir Street (Route 138)	10.87	29230	3.580	0.23	0.04	1.065	0.07	0.011	1423.400	92.29	14.398
22. High Street/Winthrop Street (Route 140)	45.63	21240	3.580	0.71	0.11	1.065	0.21	0.033	1423.400	281.63	43.934
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	25.37	19730	3.580	0.37	0.06	1.065	0.11	0.017	1423.400	145.42	22.686
33. County Street (Route 140)/Riverway Ext.	23.20	20040	3.580	0.34	0.05	1.065	0.10	0.016	1423.400	135.09	21.074
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	46.20	38030	3.580	1.28	0.20	1.065	0.38	0.060	1423.400	510.51	79.640
35. Winthrop Street (Route 44)/Highland Street	30.40	16960	3.580	0.38	0.06	1.065	0.11	0.017	1423.400	149.81	23.370
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	23.20	17570	3.580	0.30	0.05	1.065	0.09	0.014	1423.400	118.44	18.477
47. Cape Highway (Route 44)/Church Street	15.67	24730	3.580	0.28	0.04	1.065	0.08	0.013	1423.400	112.57	17.562
49. Cape Highway (Route 44)/Orchard Street	90.30	43700	3.580	2.88	0.45	1.065	0.86	0.134	1423.400	1146.59	178.868
50. Broadway (Route 138)/I-495 NB Ramps	26.40	28490	3.580	0.55	0.09	1.065	0.16	0.026	1423.400	218.54	34.093
51. Broadway (Route 138)/I-495 SB Ramps	15.73	30580	3.580	0.35	0.05	1.065	0.10	0.016	1423.400	139.80	21.808
52. Pleasant Street (Route 104)/Route 24 NB Ramps	3.90	27930	3.580	0.08	0.01	1.065	0.02	0.004	1423.400	31.65	4.937
53. Pleasant Street (Route 104)/Route 24 SB Ramps	10.53	22560	3.580	0.17	0.03	1.065	0.05	0.008	1423.400	69.05	10.771
4: O'Connell Way & Stevens Street	19.90	22650	3.580	0.33	0.05	1.065	0.10	0.015	1423.400	130.97	20.431
7: Middleboro Avenue & Stevens Street	4.77	10770	3.580	0.04	0.01	1.065	0.01	0.002	1423.400	14.92	2.327
8: Hart Street & Poole Street	82.93	13030	3.580	0.79	0.12	1.065	0.23	0.037	1423.400	313.99	48.982
10: Hess Station & County Street (Route 140)	5.70	24550	3.580	0.10	0.02	1.065	0.03	0.005	1423.400	40.66	6.343
13: Galleria Mall Drive South & Galleria Mall Drive	8.70	12490	3.580	0.08	0.01	1.065	0.02	0.004	1423.400	31.57	4.925
14: Exeter Street & Broadway (Route 138)	80.00	18360	3.580	1.07	0.17	1.065	0.32	0.050	1423.400	426.78	66.577
16: Driveway & Washington Street	115.67	24340	3.580	2.06	0.32	1.065	0.61	0.095	1423.400	818.03	127.612
19: Court Street & Broadway (Route 138)	4.27	21630	3.580	0.07	0.01	1.065	0.02	0.003	1423.400	26.82	4.183
20: Post Office Square & Court Street	34.83	19020	3.580	0.48	0.08	1.065	0.14	0.022	1423.400	192.51	30.031
21: Cohannet Street & Western Green	25.00	19140	3.580	0.35	0.05	1.065	0.10	0.016	1423.400	139.03	21.689
24: Summer Street (Route 140) & Ingell Street	34.80	16390	3.580	0.42	0.07	1.065	0.12	0.019	1423.400	165.73	25.854
25: County Street (Route 140) & Johnson Street	2.67	19120	3.580	0.04	0.01	1.065	0.01	0.002	1423.400	14.81	2.311
26: Myricks Street & Route 79 NB Ramp	3.33	12610	3.580	0.03	0.00	1.065	0.01	0.001	1423.400	12.21	1.905
27: Myricks Street & Route 79 SB Ramp	16.27	11170	3.580	0.13	0.02	1.065	0.04	0.006	1423.400	52.79	8.236
28: Middleboro Avenue & Old Colony Avenue	99.77	13550	3.580	0.99	0.15	1.065	0.29	0.046	1423.400	392.79	61.276
29: Pinehill Road & Middleboro Avenue	31.93	12830	3.580	0.30	0.05	1.065	0.09	0.014	1423.400	119.04	18.571
30: Pinehill Road & Stevens Street	4.80	7690	3.580	0.03	0.00	1.065	0.01	0.001	1423.400	10.73	1.673
31: Cohannet Street & F.R. Martin Parkway (Route 140)	27.60	12160	3.580	0.25	0.04	1.065	0.07	0.011	1423.400	97.52	15.213
32: Gordon Owen Parkway & Williams Street	121.13	15740	3.580	1.39	0.22	1.065	0.41	0.065	1423.400	554.00	86.424
36: Secondary Driveway & Stevens Street	2.13	9970	3.580	0.02	0.00	1.065	0.00	0.001	1423.400	6.18	0.964
37: 495 NB Ramp & Route 105	52.80	19650	3.580	0.76	0.12	1.065	0.23	0.035	1423.400	301.46	47.028
38: 495 SB Ramp & Route 105	15.97	19670	3.580	0.23	0.04	1.065	0.07	0.011	1423.400	91.26	14.236
40: Taunton Street & Route 18	4.67	12810	3.580	0.04	0.01	1.065	0.01	0.002	1423.400	17.37	2.710
41: 495 NB Ramp & Route 18	3.10	14270	3.580	0.03	0.01	1.065	0.01	0.002	1423.400	12.85	2.005
42: 495 SB Ramp & Route 18	52.27	18710	3.580	0.71	0.11	1.065	0.21	0.033	1423.400	284.14	44.326
44: Route 44 & 495 NB Ramp	9.23	27220	3.580	0.18	0.03	1.065	0.05	0.009	1423.400	73.03	11.392
45: Route 44 & 495 SB Ramp	116.80	25500	3.580	2.18	0.34	1.065	0.65	0.101	1423.400	865.41	135.004
46: Route 44 & Richmond Street	20.60	21440	3.580	0.32	0.05	1.065	0.10	0.015	1423.400	128.33	20.020
48: Route 44 & Hill Street	12.23	23430	3.580	0.21	0.03	1.065	0.06	0.010	1423.400	83.28	12.992
54: Paddleford Street & Route 24 NB Ramp	2.10	6740	3.580	0.01	0.00	1.065	0.00	0.000	1423.400	4.11	0.642
55: Paddleford Street & Route 24 SB Ramp	4.53	9400	3.580	0.03	0.00	1.065	0.01	0.001	1423.400	12.38	1.932
58: Middleboro Avenue & Waterpark Driveway	0.00	1	3.580	0.00	0.00	1.065	0.00	0.000	1423.400	0.00	0.000
Totals	hrs	3243.295		25.60	3.99		7.62	1.19		10177.71	1587.72

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
Link Data

Link Number	Roadway Segment	Link Distance (miles)	Average Speed (mph)	Friday AM Peak Hour Volume					
				2012 Existing	2022 No-Action	2022 Alt A	2022 Alt A Mitigated	2022 Alt B	2022 Alt B Mit
1	Bay St	0.27	35	339	362	362	362	362	362
2	Broadway 138 N of Bay St	0.33	40	1,153	1,224	1,224	1,224	1,224	1,224
3	Exeter St	0.11	35	33	34	34	34	34	34
4	Broadway 138 Exeter to Washington	0.41	40	1,344	1,431	1,431	1,431	1,431	1,431
5	Washington E of Broadway	0.17	35	242	257	255	255	255	255
6	Washington Court to Broadway	0.31	35	678	721	721	721	721	721
7	Broadway 138 Washington to Court	0.29	40	831	885	884	884	884	884
8	Washington Court to Martin	0.05	35	1,471	1,559	1,562	1,562	1,562	1,562
9	Washington Martin to Tremont	0.10	40	1,247	1,522	1,519	1,519	1,519	1,519
10	Washington/Oak S of Tremont	0.15	35	705	746	746	746	746	746
11	Tremont W of Washington	0.15	40	1,132	1,241	1,238	1,238	1,238	1,238
12	Martin Washington to Cohannet	0.19	35	561	602	599	599	599	599
13	Court Washington to PO Square	0.20	35	624	662	663	663	663	663
14	PO Square	0.07	35	76	79	81	81	81	81
15	Court PO Square to Broadway	0.05	35	949	1,011	1,010	1,010	1,010	1,010
16	Cohannet PO Square to Martin	0.08	35	302	282	324	324	324	324
17	Cohannet Martin to High	0.05	35	507	537	537	537	537	537
18	High W of 44	0.11	35	629	667	667	667	667	667
19	High E of 44	0.22	35	521	587	586	586	586	586
20	Winthrop 44 High to Highland	1.19	40	958	1,030	1,029	1,029	1,029	1,029
21	Highland W of 44	0.25	35	395	419	419	419	419	419
22	Highland E of 44	0.25	35	327	347	347	347	347	347
23	Winthrop 44 S of Highland	0.25	40	966	1,037	1,036	1,036	1,036	1,036
24	Winthrop 44 High to Main	0.19	40	658	699	699	699	699	699
25	Weir 138 S of 44	0.25	35	556	590	590	590	590	590
26	Broadway 138 Court to 44	0.06	35	1,309	1,392	1,390	1,390	1,390	1,390
27	Cohannet PO Square to Broadway	0.09	30	1,078	1,153	1,151	1,151	1,151	1,151
28	Main St Broadway to Summer	0.19	35	1,594	1,701	1,700	1,700	1,700	1,700
29	Union St	0.13	35	18	19	19	19	19	19
30	Summer St 140 Main to Ingell	0.52	40	746	802	801	801	801	801
31	Ingell S of Summer 140	0.25	35	665	719	718	718	718	718
32	County 140 Ingell to Williams	0.33	40	1,351	1,457	1,455	1,455	1,455	1,455
33	44 Union to Longmeadow-Owen	0.72	40	1,437	1,525	1,525	1,525	1,525	1,525
34	Longmeadow	0.50	35	858	917	913	913	913	913
35	Dean 44 E of Longmeadow-Owen	0.15	40	1,892	1,834	2,013	2,013	2,013	2,013
36	Owen Dean to Williams	0.55	35	1,209	1,296	1,289	1,289	1,289	1,289
37	Williams N of Owen	0.17	35	695	739	739	739	739	739
38	Williams Owen to 140	0.14	35	322	342	342	342	342	342
39	Riverway Ext	0.18	35	813	876	871	871	871	871
40	County 140 Williams to Riverway	0.12	40	963	1,045	1,043	1,043	1,043	1,043
41	County 140 Riverway to Johnson	0.52	40	1,462	1,587	1,580	1,580	1,580	1,580
42	Johnson N of 140	0.47	35	15	16	16	16	16	16
43	Johnson S of 140	0.26	35	22	23	24	24	24	24
44	Trucchis Driveway	0.04	20	75	79	79	79	79	79
45	County 140 Johnson to Hart	0.27	40	1,375	1,496	1,489	1,489	1,489	1,489
46	Hart W of 140	0.15	35	730	778	777	777	777	777
47	Hart 140 to Poole	0.73	35	651	719	708	708	708	708
48	County 140 Hart to Erika	0.41	40	1,600	1,710	1,712	1,712	1,712	1,712
49	Erika Drive	0.14	35	337	355	355	355	355	355
50	BPRTHS Driveway S End	0.35	20	320	340	340	340	340	340
51	BPRTHS Driveway N End	0.30	20	358	379	379	379	379	379
52	Hess Station opposite BPRTHS Driveway	0.02	20	116	123	123	123	123	123
53	County 140 Erika to BPRTHS Driveway	0.12	40	1,562	1,671	1,674	1,674	1,674	1,674
54	County 140 BPRTHS Driveway to Mozzone	0.21	40	1,622	1,735	1,738	1,738	1,738	1,738
55	Mozzone Blvd	0.21	35	92	99	99	99	99	99
56	County 140 Mozzone to 24 SB Ramp	0.24	40	1,679	1,795	1,798	1,798	1,799	1,799
57	County 140 SB ramp to NB Ramp	0.17	40	2,097	2,383	2,388	2,388	2,412	2,412
58	County 140 NB Ramp to Stevens St	0.42	40	2,740	3,093	3,116	3,116	3,147	3,147
59	24 SB off/on ramp	0.21	30	1,095	1,305	1,307	1,307	1,329	1,329
60	24 NB off/on ramp	0.22	30	1,763	1,900	1,917	1,917	1,924	1,924
61	Poole St	0.17	35	449	484	481	481	481	481

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
Link Data

Link Number	Roadway Segment	Link Distance (miles)	Average Speed (mph)	Friday AM Peak Hour Volume					
				2012 Existing	2022 No-Action	2022 Alt A	2022 Alt A Mitigated	2022 Alt B	2022 Alt B Mit
62	Middleboro Poole to Stevens	0.47	35	899	988	973	973	973	973
63	Stevens Middleboro to Pinehill	0.27	35	209	257	246	246	246	246
64	Secondary Site Driveway	0.25	20	0	0	33	57	47	61
65	Stevens Pinehill to O'Connell	0.60	35	435	495	494	496	494	494
66	O'Connell W of Stevens	0.46	35	172	272	283	259	334	320
67	Cotley St	0.40	35	174	416	417	417	417	417
68	Middleboro Stevens to Pinehill	0.32	35	712	755	755	755	755	755
69	Caswell St	0.16	35	490	523	521	521	521	521
70	Pinehill Stevens to Middleboro	0.27	35	332	368	363	363	363	363
71	Middleboro Caswell to Liberty	0.60	35	673	729	726	726	726	726
72	Middleboro E of Liberty	0.19	35	368	391	391	391	391	391
73	Liberty S of Middleboro	0.68	35	266	283	283	283	283	283
74	Old Colony Ave N of Middleboro	0.19	35	622	673	670	670	670	670
75	Stevens S of O'Connell	0.13	35	635	963	973	973	1,024	1,024
77	Stevens Street Connector	0.24	30	571	802	801	801	830	830
78	Galleria Mall Drive N	0.20	35	39	43	43	43	43	43
79	Galleria Mall Drive S	0.23	35	102	111	111	111	111	111
80	Galleria Mall Drive	0.07	35	134	145	145	145	145	145
81	140 NB Ramp to Stevens St Ext	0.23	30	163	229	216	216	228	228
82	Steven St Ext Ramp to 140 NB	0.21	30	222	272	295	295	306	306
83	140 SB Ramp to Stevens St Connector	0.15	30	216	412	409	409	435	435
84	Galleria Mall Dr Ramp to 140 SB	0.17	30	62	78	79	79	82	82
85	Stevens St Mall Connector Overpass WB	0.20	30	19	21	21	21	21	21
86	Stevens St Mall Connector Overpass EB	0.20	30	13	14	14	14	14	14
87	Myricks St 79 S of 140	0.30	40	597	634	634	634	634	634
88	Myricks St 79 N of 140	0.30	40	750	837	827	827	827	827
89	Myricks St 79 under 140	0.12	40	659	707	708	708	708	708
90	140 SB Ramp to Myricks St 79	0.21	30	123	140	141	141	141	141
91	Myricks St 79 Ramp to 140 SB	0.24	30	89	95	95	95	95	95
92	140 NB Ramp to Myricks St 79	0.17	30	146	155	155	155	155	155
93	Myricks St 79 Ramp to 140 NB	0.19	30	283	335	324	324	324	324
94	Rte 44 West of Orchard	0.25	40	2,669	2,860	2,855	2,855	2,855	2,855
95	Orchard N of 44	0.25	35	434	464	464	464	464	464
96	Orchard S of 44	0.25	35	689	744	741	741	741	741
97	Rte 44 Orchard to Hill	1.25	40	1,569	1,706	1,697	1,697	1,697	1,697
98	Hill N of 44	0.25	35	72	75	75	75	75	75
99	Hill S of 44	0.25	35	94	99	99	99	99	99
100	Rte 44 Hill to Church	0.46	40	1,581	1,719	1,709	1,709	1,709	1,709
101	Church N of 44	0.25	35	172	183	183	183	183	183
102	Church S of 44	0.25	35	231	246	246	246	246	246
103	Rte 44 Church to Richmond	0.88	40	1,468	1,599	1,589	1,589	1,589	1,589
104	Richmond N of 44	0.25	35	137	145	145	145	145	145
105	Richmond S of 44	0.25	35	89	94	94	94	94	94
106	Rte 44 Richmond to 495 SB ramps	1.18	40	1,498	1,662	1,622	1,622	1,622	1,622
107	495 SB Ramps (off) to Rte 44	0.25	30	612	650	650	650	650	650
108	495 SB Ramps (on) from Rte 44	0.25	30	163	173	173	173	173	173
109	Rte 44 SB Ramps to NB Ramps	0.17	40	1,927	2,087	2,077	2,077	2,077	2,077
110	495 NB Ramps (off) to Rte 44	0.25	30	291	309	309	309	309	309
111	495 NB Ramps (on) from Rte 44	0.25	30	653	693	693	693	693	693
112	Rte 44 NB Ramps to Rotary	0.17	40	2,134	2,306	2,296	2,296	2,296	2,296
113	Bedford 28/18 N of Rotary	0.25	40	1,395	1,481	1,481	1,481	1,481	1,481
114	Rte 44 E of Rotary	0.25	40	1,507	1,641	1,631	1,631	1,631	1,631
115	W. Grove 28 SE of Rotary	0.25	40	785	833	833	833	833	833
116	Bedford 18 S of Rotary to 495 NB Ramps	0.17	40	801	849	849	849	849	849
117	Bedford 18 S of Rotary NB to SB ramps	0.19	40	1,029	1,093	1,093	1,093	1,093	1,093
118	495 NB Ramps (off) to Rte 18	0.28	30	278	295	295	295	295	295
119	495 NB Ramps (on) from Rte 18	0.28	30	277	294	294	294	294	294
120	495 SB Ramps (off) to Rte 18	0.28	30	253	268	268	268	268	268
121	495 SB Ramps (on) from Rte 18	0.28	30	94	100	100	100	100	100
122	Bedford 495 SB Ramps to Taunton St	0.46	40	943	1,000	1,000	1,000	1,000	1,000
123	Taunton St E of Rte 18	0.25	35	50	52	52	52	52	52

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
Link Data

Link Number	Roadway Segment	Link Distance (miles)	Average Speed (mph)	Friday AM Peak Hour Volume					
				2012 Existing	2022 No-Action	2022 Alt A	2022 Alt A Mitigated	2022 Alt B	2022 Alt B Mit
124	Taunton St W of Rte 18	25.00	35	162	171	171	171	171	171
125	Bedford 18 S of Taunton St.	0.25	40	902	957	957	957	957	957
126	Rte 138 N of 495	0.25	40	1,915	2,033	2,033	2,033	2,033	2,033
127	Rte 138 ramp to 495 NB	0.27	30	540	573	573	573	573	573
128	495 NB ramp to Rte 138	0.27	30	257	272	272	272	272	272
129	Rte 138 NB Ramps to SB ramps	0.15	40	1,910	2,028	2,028	2,028	2,028	2,028
130	Rte 138 ramp to 495 SB	0.27	30	336	356	356	356	356	356
131	495 SB ramp to 138	0.27	30	472	502	502	502	502	502
132	Rte 138 S of 495	0.25	40	2,010	2,134	2,134	2,134	2,134	2,134
133	Padelford St N of 24 SB Ramps	0.25	35	592	632	631	631	631	631
134	Rte 24 SB Ramp to Padelford St	0.20	30	104	110	109	109	109	109
135	Rte 24 SB Ramp from Padelford St	0.20	30	81	86	86	86	86	86
136	Padelford St SB Ramps to NB Ramps	0.29	35	513	548	548	548	548	548
137	Rte 24 NB Ramp to Padelford St	0.20	30	48	51	51	51	51	51
138	Rte 24 NB Ramp from Padelford St	0.20	30	440	470	470	470	470	470
139	Padelford St S of 24 NB Ramps	0.25	35	269	285	285	285	285	285
140	Bedford St Rte 18 N of Rte 79	0.25	40	895	950	950	950	950	950
141	Bedford St Rte 18 S of Rte 79	0.25	40	581	617	617	617	617	617
142	RI Rd Rte 79 W of Rte 18	0.25	40	601	679	669	669	669	669
143	RI Rd Rte 79 E of Rte 18	0.25	40	479	550	540	540	540	540
144	Rte 104 Pleasant St W of Rte 24 SB Ramps	0.25	40	765	813	813	813	813	813
145	Rte 24 SB Ramp to Rte 104	0.28	30	192	204	204	204	204	204
146	Rte 24 SB Ramp from Rte 104	0.28	30	752	809	804	804	804	804
147	Rte 104 SB ramps to NB Ramps	0.23	40	1,521	1,626	1,621	1,621	1,621	1,621
148	Rte 24 NB ramp to Rte 104	0.28	30	604	643	643	643	643	643
149	Rte 24 NB ramp from Rte 104	0.28	30	526	558	558	558	558	558
150	Rte 104 Pleasant St E of Rte 24 NB Ramps	0.25	40	2,210	2,359	2,354	2,354	2,354	2,354
151	Rte 105 S of Rte 495 SB Ramps	0.25	40	1,061	1,166	1,156	1,156	1,156	1,156
152	Rte 495 SB Ramp to Rte 105	0.20	30	258	274	274	274	274	274
153	Rte 495 SB Ramp from Rte 105	0.20	30	126	135	137	137	137	137
154	Rte 105 SB ramps to NB Ramps	0.23	40	1,135	1,243	1,231	1,231	1,231	1,231
155	Rte 495 NB Ramp to Rte 105	0.20	30	203	223	224	224	224	224
156	Rte 495 NB Ramp from Rte 105	0.20	30	615	653	653	653	653	653
157	Rte 105 N of Rte 495 NB Ramps	0.25	40	1,539	1,663	1,651	1,651	1,651	1,651

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
Link Data

Link Number	Roadway Segment	Link Distance (miles)	Average Speed (mph)	Friday PM Peak Hour Volume					
				2012 Existing	2022 No-Action	2022 Alt A	2022 Alt A Mitigated	2022 Alt B	2022 Alt B Mit
1	Bay St	0.27	35	524	557	565	565	565	565
2	Broadway 138 N of Bay St	0.33	40	1,196	1,271	1,279	1,279	1,279	1,279
3	Exeter St	0.11	35	30	34	30	30	30	30
4	Broadway 138 Exeter to Washington	0.41	40	1,641	1,744	1,760	1,760	1,760	1,760
5	Washington E of Broadway	0.17	35	406	432	432	432	432	432
6	Washington Court to Broadway	0.31	35	967	1,025	1,028	1,028	1,028	1,028
7	Broadway 138 Washington to Court	0.29	40	1,067	1,137	1,151	1,151	1,151	1,151
8	Washington Court to Martin	0.05	35	1,866	1,983	1,983	1,983	1,983	1,983
9	Washington Martin to Tremont	0.10	40	1,752	1,866	1,885	1,885	1,885	1,885
10	Washington/Oak S of Tremont	0.15	35	923	980	980	980	980	980
11	Tremont W of Washington	0.15	40	1,463	1,559	1,577	1,577	1,577	1,577
12	Martin Washington to Cohannet	0.19	35	770	824	842	842	842	842
13	Court Washington to PO Square	0.20	35	691	734	734	734	734	734
14	PO Square	0.07	35	271	287	287	287	287	287
15	Court PO Square to Broadway	0.05	35	1,457	1,554	1,570	1,570	1,570	1,570
16	Cohannet PO Square to Martin	0.08	35	583	625	643	643	643	643
17	Cohannet Martin to High	0.05	35	962	1,021	1,021	1,021	1,021	1,021
18	High W of 44	0.11	35	1,008	1,071	1,071	1,071	1,071	1,071
19	High E of 44	0.22	35	776	836	889	889	889	889
20	Winthrop 44 High to Highland	1.19	40	1,181	1,258	1,311	1,311	1,311	1,311
21	Highland W of 44	0.25	35	457	488	488	488	488	488
22	Highland E of 44	0.25	35	437	467	467	467	467	467
23	Winthrop 44 S of Highland	0.25	40	1,476	1,569	1,622	1,622	1,622	1,622
24	Winthrop 44 High to Main	0.19	40	758	806	806	806	806	806
25	Weir 138 S of 44	0.25	35	816	866	866	866	866	866
26	Broadway 138 Court to 44	0.06	35	1,498	1,599	1,612	1,612	1,612	1,612
27	Cohannet PO Square to Broadway	0.09	30	1,337	1,420	1,439	1,439	1,439	1,439
28	Main St Broadway to Summer	0.19	35	1,837	1,960	1,992	1,992	1,992	1,992
29	Union St	0.13	35	50	54	54	54	54	54
30	Summer St 140 Main to Ingell	0.52	40	815	873	905	905	905	905
31	Ingell S of Summer 140	0.25	35	759	817	870	870	870	870
32	County 140 Ingell to Williams	0.33	40	1,450	1,558	1,643	1,643	1,643	1,643
33	44 Union to Longmeadow-Owen	0.72	40	1,609	1,711	1,711	1,711	1,711	1,711
34	Longmeadow	0.50	35	1,029	1,100	1,106	1,106	1,106	1,106
35	Dean 44 E of Longmeadow-Owen	0.15	40	2,723	2,895	2,907	2,907	2,907	2,907
36	Owen Dean to Williams	0.55	35	1,307	1,397	1,415	1,415	1,415	1,415
37	Williams N of Owen	0.17	35	549	583	583	583	583	583
38	Williams Owen to 140	0.14	35	355	376	376	376	376	376
39	Riverway Ext	0.18	35	778	837	855	855	855	855
40	County 140 Williams to Riverway	0.12	40	1,095	1,182	1,268	1,268	1,268	1,268
41	County 140 Riverway to Johnson	0.52	40	1,785	1,927	2,030	2,030	2,030	2,030
42	Johnson N of 140	0.47	35	15	16	16	16	16	16
43	Johnson S of 140	0.26	35	61	66	66	66	66	66
44	Trucchis Driveway	0.04	20	148	158	158	158	158	158
45	County 140 Johnson to Hart	0.27	40	1,748	1,889	1,992	1,992	1,992	1,992
46	Hart W of 140	0.15	35	915	975	983	983	983	983
47	Hart 140 to Poole	0.73	35	777	847	871	871	871	871
48	County 140 Hart to Erika	0.41	40	2,193	2,340	2,428	2,428	2,428	2,428
49	Erika Drive	0.14	35	933	990	990	990	990	990
50	BPRTHS Driveway S End	0.35	20	86	91	91	91	91	91
51	BPRTHS Driveway N End	0.30	20	67	71	71	71	71	71
52	Hess Station opposite BPRTHS Driveway	0.02	20	226	241	241	241	241	241
53	County 140 Erika to BPRTHS Driveway	0.12	40	2,152	2,295	2,383	2,383	2,383	2,383
54	County 140 BPRTHS Driveway to Mozzone	0.21	40	2,162	2,306	2,394	2,394	2,394	2,394
55	Mozzone Blvd	0.21	35	493	522	522	522	522	522
56	County 140 Mozzone to 24 SB Ramp	0.24	40	2,370	2,525	2,613	2,613	2,592	2,592
57	County 140 SB ramp to NB Ramp	0.17	40	3,241	3,507	4,185	4,185	3,922	3,922
58	County 140 NB Ramp to Stevens St	0.42	40	3,754	4,172	5,213	5,213	4,820	4,820
59	24 SB off/on ramp	0.21	30	2,000	2,177	2,767	2,767	2,538	2,538
60	24 NB off/on ramp	0.22	30	1,420	1,628	1,989	1,989	1,859	1,859
61	Poole St	0.17	35	472	508	520	520	520	520

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
Link Data

Link Number	Roadway Segment	Link Distance (miles)	Average Speed (mph)	Friday PM Peak Hour Volume					
				2012 Existing	2022 No-Action	2022 Alt A	2022 Alt A Mitigated	2022 Alt B	2022 Alt B Mit
62	Middleboro Poole to Stevens	0.47	35	974	1,063	1,099	1,099	1,099	1,099
63	Stevens Middleboro to Pinehill	0.27	35	279	325	361	361	361	361
64	Secondary Site Driveway	0.25	20	0	0	133	204	114	175
65	Stevens Pinehill to O'Connell	0.60	35	787	882	911	912	911	911
66	O'Connell W of Stevens	0.46	35	278	337	1,729	1,658	1,207	1,146
67	Cotley St	0.40	35	184	441	441	441	441	441
68	Middleboro Stevens to Pinehill	0.32	35	709	752	752	752	752	752
69	Caswell St	0.16	35	358	384	386	386	386	386
70	Pinehill Stevens to Middleboro	0.27	35	429	471	508	508	508	508
71	Middleboro Caswell to Liberty	0.60	35	862	927	962	962	962	962
72	Middleboro E of Liberty	0.19	35	496	526	488	488	488	488
73	Liberty S of Middleboro	0.68	35	301	320	320	320	320	320
74	Old Colony Ave N of Middleboro	0.19	35	857	922	957	957	957	957
75	Stevens S of O'Connell	0.13	35	944	1,253	2,645	2,645	2,123	2,123
77	Stevens Street Connector	0.24	30	1,291	1,450	2,220	2,220	1,923	1,883
78	Galleria Mall Drive N	0.20	35	438	465	465	465	465	465
79	Galleria Mall Drive S	0.23	35	628	667	667	667	667	667
80	Galleria Mall Drive	0.07	35	978	1,038	1,038	1,038	1,038	1,038
81	140 NB Ramp to Stevens St Ext	0.23	30	145	164	295	295	246	246
82	Steven St Ext Ramp to 140 NB	0.21	30	638	841	1,333	1,333	1,155	1,155
83	140 SB Ramp to Stevens St Connector	0.15	30	129	167	845	845	578	578
84	Galleria Mall Dr Ramp to 140 SB	0.17	30	269	336	428	428	398	398
85	Stevens St Mall Connector Overpass WB	0.20	30	143	152	152	152	152	152
86	Stevens St Mall Connector Overpass EB	0.20	30	164	175	175	175	175	175
87	Myricks St 79 S of 140	0.30	40	752	799	799	799	799	799
88	Myricks St 79 N of 140	0.30	40	960	1,054	1,159	1,159	1,159	1,159
89	Myricks St 79 under 140	0.12	40	856	939	982	982	982	982
90	140 SB Ramp to Myricks St 79	0.21	30	285	333	376	376	376	376
91	Myricks St 79 Ramp to 140 SB	0.24	30	154	163	163	163	163	163
92	140 NB Ramp to Myricks St 79	0.17	30	104	110	110	110	110	110
93	Myricks St 79 Ramp to 140 NB	0.19	30	298	322	384	384	384	384
94	Rte 44 West of Orchard	0.25	40	3,447	3,683	3,754	3,754	3,754	3,754
95	Orchard N of 44	0.25	35	770	818	818	818	818	818
96	Orchard S of 44	0.25	35	783	1,021	1,056	1,056	1,056	1,056
97	Rte 44 Orchard to Hill	1.25	40	2,786	2,992	3,098	3,098	3,098	3,098
98	Hill N of 44	0.25	35	123	130	130	130	130	130
99	Hill S of 44	0.25	35	139	148	148	148	148	148
100	Rte 44 Hill to Church	0.46	40	2,017	2,177	2,282	2,282	2,282	2,282
101	Church N of 44	0.25	35	247	264	262	262	262	262
102	Church S of 44	0.25	35	315	334	334	334	334	334
103	Rte 44 Church to Richmond	0.88	40	1,990	2,147	2,252	2,252	2,252	2,252
104	Richmond N of 44	0.25	35	233	248	247	247	247	247
105	Richmond S of 44	0.25	35	59	62	62	62	62	62
106	Rte 44 Richmond to 495 SB ramps	1.18	40	1,745	1,888	1,993	1,993	1,993	1,993
107	495 SB Ramps (off) to Rte 44	0.25	30	627	666	666	666	666	666
108	495 SB Ramps (on) from Rte 44	0.25	30	357	379	379	379	379	379
109	Rte 44 SB Ramps to NB Ramps	0.17	40	1,931	2,085	2,190	2,190	2,190	2,190
110	495 NB Ramps (off) to Rte 44	0.25	30	167	177	177	177	177	177
111	495 NB Ramps (on) from Rte 44	0.25	30	631	670	670	670	670	670
112	Rte 44 NB Ramps to Rotary	0.17	40	2,237	2,411	2,516	2,516	2,516	2,516
113	Bedford 28/18 N of Rotary	0.25	40	1,099	1,166	1,166	1,166	1,166	1,166
114	Rte 44 E of Rotary	0.25	40	1,784	1,930	2,035	2,035	2,035	2,035
115	W. Grove 28 SE of Rotary	0.25	40	1,254	1,332	1,332	1,332	1,332	1,332
116	Bedford 18 S of Rotary to 495 NB Ramps	0.17	40	1,088	1,156	1,156	1,156	1,156	1,156
117	Bedford 18 S of Rotary NB to SB ramps	0.19	40	1,242	1,319	1,319	1,319	1,319	1,319
118	495 NB Ramps (off) to Rte 18	0.28	30	118	126	126	126	126	126
119	495 NB Ramps (on) from Rte 18	0.28	30	209	222	222	222	222	222
120	495 SB Ramps (off) to Rte 18	0.28	30	678	720	720	720	720	720
121	495 SB Ramps (on) from Rte 18	0.28	30	189	201	201	201	201	201
122	Bedford 495 SB Ramps to Taunton St	0.46	40	1,332	1,413	1,413	1,413	1,413	1,413
123	Taunton St E of Rte 18	0.25	35	47	49	49	49	49	49

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
Link Data

Link Number	Roadway Segment	Link Distance (miles)	Average Speed (mph)	Friday PM Peak Hour Volume					
				2012 Existing	2022 No-Action	2022 Alt A	2022 Alt A Mitigated	2022 Alt B	2022 Alt B Mit
124	Taunton St W of Rte 18	25.00	35	251	266	266	266	266	266
125	Bedford 18 S of Taunton St.	0.25	40	995	1,056	1,056	1,056	1,056	1,056
126	Rte 138 N of 495	0.25	40	2,233	2,371	2,371	2,371	2,371	2,371
127	Rte 138 ramp to 495 NB	0.27	30	515	547	547	547	547	547
128	495 NB ramp to Rte 138	0.27	30	315	335	335	335	335	335
129	Rte 138 NB Ramps to SB ramps	0.15	40	2,303	2,445	2,445	2,445	2,445	2,445
130	Rte 138 ramp to 495 SB	0.27	30	316	336	336	336	336	336
131	495 SB ramp to 138	0.27	30	695	738	738	738	738	738
132	Rte 138 S of 495	0.25	40	2,446	2,597	2,597	2,597	2,597	2,597
133	Padelford St N of 24 SB Ramps	0.25	35	767	817	831	831	831	831
134	Rte 24 SB Ramp to Padelford St	0.20	30	424	453	459	459	459	459
135	Rte 24 SB Ramp from Padelford St	0.20	30	60	63	63	63	63	63
136	Padelford St SB Ramps to NB Ramps	0.29	35	515	547	555	555	555	555
137	Rte 24 NB Ramp to Padelford St	0.20	30	74	78	78	78	78	78
138	Rte 24 NB Ramp from Padelford St	0.20	30	216	230	238	238	238	238
139	Padelford St S of 24 NB Ramps	0.25	35	407	431	403	403	403	403
140	Bedford St Rte 18 N of Rte 79	0.25	40	1,107	1,175	1,125	1,125	1,125	1,125
141	Bedford St Rte 18 S of Rte 79	0.25	40	736	781	781	781	781	781
142	RI Rd Rte 79 W of Rte 18	0.25	40	782	865	970	970	970	970
143	RI Rd Rte 79 E of Rte 18	0.25	40	621	693	748	748	748	748
144	Rte 104 Pleasant St W of Rte 24 SB Ramps	0.25	40	1,352	1,182	1,182	1,182	1,182	1,182
145	Rte 24 SB Ramp to Rte 104	0.28	30	704	747	747	747	747	747
146	Rte 24 SB Ramp from Rte 104	0.28	30	653	694	709	709	709	709
147	Rte 104 SB ramps to NB Ramps	0.23	40	1,779	1,889	1,904	1,904	1,904	1,904
148	Rte 24 NB ramp to Rte 104	0.28	30	704	758	767	767	767	767
149	Rte 24 NB ramp from Rte 104	0.28	30	288	306	306	306	306	306
150	Rte 104 Pleasant St E of Rte 24 NB Ramps	0.25	40	2,469	2,632	2,656	2,656	2,656	2,656
151	Rte 105 S of Rte 495 SB Ramps	0.25	40	1,423	1,547	1,652	1,652	1,652	1,652
152	Rte 495 SB Ramp to Rte 105	0.20	30	481	511	511	511	511	511
153	Rte 495 SB Ramp from Rte 105	0.20	30	190	210	238	238	238	238
154	Rte 105 SB ramps to NB Ramps	0.23	40	1,542	1,665	1,742	1,742	1,742	1,742
155	Rte 495 NB Ramp to Rte 105	0.20	30	154	164	203	203	203	203
156	Rte 495 NB Ramp from Rte 105	0.20	30	264	280	280	280	280	280
157	Rte 105 N of Rte 495 NB Ramps	0.25	40	1,692	2,022	1,861	1,861	1,861	1,861

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
Link Data

Link Number	Roadway Segment	Link Distance (miles)	Average Speed (mph)	Saturday Midday Peak Hour Volume					
				2012 Existing	2022 No-Action	2022 Alt A	2022 Alt A Mitigated	2022 Alt B	2022 Alt B Mit
1	Bay St	0.27	35	366	390	393	393	393	393
2	Broadway 138 N of Bay St	0.33	40	1,080	1,149	1,152	1,152	1,152	1,152
3	Exeter St	0.11	35	18	19	19	19	19	19
4	Broadway 138 Exeter to Washington	0.41	40	1,410	1,500	1,506	1,506	1,506	1,506
5	Washington E of Broadway	0.17	35	283	299	299	299	299	299
6	Washington Court to Broadway	0.31	35	725	770	770	770	770	770
7	Broadway 138 Washington to Court	0.29	40	1,037	1,102	1,111	1,111	1,111	1,111
8	Washington Court to Martin	0.05	35	1,519	1,612	1,612	1,612	1,612	1,612
9	Washington Martin to Tremont	0.10	40	1,393	1,485	1,492	1,492	1,492	1,492
10	Washington/Oak S of Tremont	0.15	35	803	852	852	852	852	852
11	Tremont W of Washington	0.15	40	1,125	1,200	1,207	1,207	1,207	1,207
12	Martin Washington to Cohannet	0.19	35	601	643	650	650	650	650
13	Court Washington to PO Square	0.20	35	595	631	631	631	631	631
14	PO Square	0.07	35	104	110	110	110	110	110
15	Court PO Square to Broadway	0.05	35	1,348	1,435	1,442	1,442	1,442	1,442
16	Cohannet PO Square to Martin	0.08	35	400	430	437	437	437	437
17	Cohannet Martin to High	0.05	35	610	647	647	647	647	647
18	High W of 44	0.11	35	623	660	660	660	660	660
19	High E of 44	0.22	35	593	638	663	663	663	663
20	Winthrop 44 High to Highland	1.19	40	1,165	1,245	1,270	1,270	1,270	1,270
21	Highland W of 44	0.25	35	404	428	428	428	428	428
22	Highland E of 44	0.25	35	307	326	326	326	326	326
23	Winthrop 44 S of Highland	0.25	40	1,383	1,476	1,501	1,501	1,501	1,501
24	Winthrop 44 High to Main	0.19	40	838	889	889	889	889	889
25	Weir 138 S of 44	0.25	35	676	717	717	717	717	717
26	Broadway 138 Court to 44	0.06	35	1,400	1,490	1,496	1,496	1,496	1,496
27	Cohannet PO Square to Broadway	0.09	30	1,302	1,385	1,393	1,393	1,393	1,393
28	Main St Broadway to Summer	0.19	35	1,864	1,985	2,000	2,000	2,000	2,000
29	Union St	0.13	35	45	48	48	48	48	48
30	Summer St 140 Main to Ingell	0.52	40	720	772	787	787	787	787
31	Ingell S of Summer 140	0.25	35	627	674	699	699	699	699
32	County 140 Ingell to Williams	0.33	40	1,233	1,325	1,365	1,365	1,365	1,365
33	44 Union to Longmeadow-Owen	0.72	40	1,514	1,608	1,608	1,608	1,608	1,608
34	Longmeadow	0.50	35	934	997	999	999	999	999
35	Dean 44 E of Longmeadow-Owen	0.15	40	2,527	2,690	2,694	2,694	2,694	2,694
36	Owen Dean to Williams	0.55	35	1,126	1,207	1,215	1,215	1,215	1,215
37	Williams N of Owen	0.17	35	434	461	461	461	461	461
38	Williams Owen to 140	0.14	35	241	256	256	256	256	256
39	Riverway Ext	0.18	35	726	780	789	789	789	789
40	County 140 Williams to Riverway	0.12	40	905	977	1,018	1,018	1,018	1,018
41	County 140 Riverway to Johnson	0.52	40	1,651	1,776	1,826	1,826	1,826	1,826
42	Johnson N of 140	0.47	35	10	11	11	11	11	11
43	Johnson S of 140	0.26	35	54	57	57	57	57	57
44	Trucchis Driveway	0.04	20	153	161	161	161	161	161
45	County 140 Johnson to Hart	0.27	40	1,597	1,722	1,772	1,772	1,772	1,772
46	Hart W of 140	0.15	35	895	951	956	956	956	956
47	Hart 140 to Poole	0.73	35	761	825	837	837	837	837
48	County 140 Hart to Erika	0.41	40	2,176	2,320	2,361	2,361	2,361	2,361
49	Erika Drive	0.14	35	1,390	1,477	1,477	1,477	1,477	1,477
50	BPRTHS Driveway S End	0.35	20	32	35	35	35	35	35
51	BPRTHS Driveway N End	0.30	20	14	15	15	15	15	15
52	Hess Station opposite BPRTHS Driveway	0.02	20	152	162	162	162	162	162
53	County 140 Erika to BPRTHS Driveway	0.12	40	1,994	2,127	2,168	2,168	2,168	2,168
54	County 140 BPRTHS Driveway to Mozzone	0.21	40	2,020	2,153	2,194	2,194	2,194	2,194
55	Mozzone Blvd	0.21	35	541	574	574	574	574	574
56	County 140 Mozzone to 24 SB Ramp	0.24	40	2,193	2,338	2,379	2,379	2,369	2,369
57	County 140 SB ramp to NB Ramp	0.17	40	2,615	2,854	3,170	3,170	3,039	3,039
58	County 140 NB Ramp to Stevens St	0.42	40	2,793	3,099	3,591	3,591	3,387	3,387
59	24 SB off/on ramp	0.21	30	1,285	1,434	1,708	1,708	1,595	1,595
60	24 NB off/on ramp	0.22	30	1,142	1,265	1,440	1,440	1,371	1,371
61	Poole St	0.17	35	366	394	399	399	399	399

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
Link Data

Link Number	Roadway Segment	Link Distance (miles)	Average Speed (mph)	Saturday Midday Peak Hour Volume					
				2012 Existing	2022 No-Action	2022 Alt A	2022 Alt A Mitigated	2022 Alt B	2022 Alt B Mit
62	Middleboro Poole to Stevens	0.47	35	842	917	934	934	934	934
63	Stevens Middleboro to Pinehill	0.27	35	219	255	272	272	272	272
64	Secondary Site Driveway	0.25	20	0	0	76	130	60	104
65	Stevens Pinehill to O'Connell	0.60	35	451	503	520	520	520	520
66	O'Connell W of Stevens	0.46	35	173	290	951	897	676	632
67	Cotley St	0.40	35	69	172	172	172	172	172
68	Middleboro Stevens to Pinehill	0.32	35	595	633	633	633	633	633
69	Caswell St	0.16	35	311	333	335	335	335	335
70	Pinehill Stevens to Middleboro	0.27	35	305	329	354	354	354	354
71	Middleboro Caswell to Liberty	0.60	35	691	744	761	761	761	761
72	Middleboro E of Liberty	0.19	35	433	460	460	460	460	460
73	Liberty S of Middleboro	0.68	35	347	370	370	370	370	370
74	Old Colony Ave N of Middleboro	0.19	35	722	776	793	793	793	793
75	Stevens S of O'Connell	0.13	35	558	784	1,446	1,446	1,170	1,170
77	Stevens Street Connector	0.24	30	1,268	1,444	1,805	1,805	1,651	1,651
78	Galleria Mall Drive N	0.20	35	581	617	617	617	617	617
79	Galleria Mall Drive S	0.23	35	654	694	694	694	694	694
80	Galleria Mall Drive	0.07	35	1,118	1,188	1,188	1,188	1,188	1,188
81	140 NB Ramp to Stevens St Ext	0.23	30	158	190	250	250	223	223
82	Steven St Ext Ramp to 140 NB	0.21	30	543	648	889	889	793	793
83	140 SB Ramp to Stevens St Connector	0.15	30	94	176	489	489	356	356
84	Galleria Mall Dr Ramp to 140 SB	0.17	30	114	143	191	191	170	170
85	Stevens St Mall Connector Overpass WB	0.20	30	176	186	186	186	186	186
86	Stevens St Mall Connector Overpass EB	0.20	30	183	194	194	194	194	194
87	Myricks St 79 S of 140	0.30	40	563	598	598	598	598	598
88	Myricks St 79 N of 140	0.30	40	771	845	898	898	898	898
89	Myricks St 79 under 140	0.12	40	648	701	725	725	725	725
90	140 SB Ramp to Myricks St 79	0.21	30	259	289	313	313	313	313
91	Myricks St 79 Ramp to 140 SB	0.24	30	59	62	62	62	62	62
92	140 NB Ramp to Myricks St 79	0.17	30	77	81	81	81	81	81
93	Myricks St 79 Ramp to 140 NB	0.19	30	319	353	382	382	382	382
94	Rte 44 West of Orchard	0.25	40	3,134	3,345	3,379	3,379	3,379	3,379
95	Orchard N of 44	0.25	35	647	686	686	686	686	686
96	Orchard S of 44	0.25	35	788	846	863	863	863	863
97	Rte 44 Orchard to Hill	1.25	40	2,311	2,480	2,532	2,532	2,532	2,532
98	Hill N of 44	0.25	35	116	123	123	123	123	123
99	Hill S of 44	0.25	35	125	132	132	132	132	132
100	Rte 44 Hill to Church	0.46	40	2,028	2,180	2,233	2,233	2,233	2,233
101	Church N of 44	0.25	35	207	220	220	220	220	220
102	Church S of 44	0.25	35	216	230	230	230	230	230
103	Rte 44 Church to Richmond	0.88	40	1,757	1,892	1,945	1,945	1,945	1,945
104	Richmond N of 44	0.25	35	168	178	178	178	178	178
105	Richmond S of 44	0.25	35	74	78	78	78	78	78
106	Rte 44 Richmond to 495 SB ramps	1.18	40	1,691	1,823	1,876	1,876	1,876	1,876
107	495 SB Ramps (off) to Rte 44	0.25	30	514	546	546	546	546	546
108	495 SB Ramps (on) from Rte 44	0.25	30	211	224	224	224	224	224
109	Rte 44 SB Ramps to NB Ramps	0.17	40	2,000	2,151	2,204	2,204	2,204	2,204
110	495 NB Ramps (off) to Rte 44	0.25	30	169	179	179	179	179	179
111	495 NB Ramps (on) from Rte 44	0.25	30	600	637	637	637	637	637
112	Rte 44 NB Ramps to Rotary	0.17	40	2,163	2,322	2,372	2,372	2,372	2,372
113	Bedford 28/18 N of Rotary	0.25	40	1,006	1,068	1,068	1,068	1,068	1,068
114	Rte 44 E of Rotary	0.25	40	953	1,037	1,086	1,086	1,086	1,086
115	W. Grove 28 SE of Rotary	0.25	40	1,411	1,508	1,508	1,508	1,508	1,508
116	Bedford 18 S of Rotary to 495 NB Ramps	0.17	40	863	915	915	915	915	915
117	Bedford 18 S of Rotary NB to SB ramps	0.19	40	877	930	930	930	930	930
118	495 NB Ramps (off) to Rte 18	0.28	30	135	143	143	143	143	143
119	495 NB Ramps (on) from Rte 18	0.28	30	117	124	124	124	124	124
120	495 SB Ramps (off) to Rte 18	0.28	30	203	215	215	215	215	215
121	495 SB Ramps (on) from Rte 18	0.28	30	109	115	115	115	115	115
122	Bedford 495 SB Ramps to Taunton St	0.46	40	936	995	995	995	995	995
123	Taunton St E of Rte 18	0.25	35	8	10	10	10	10	10

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
Link Data

Link Number	Roadway Segment	Link Distance (miles)	Average Speed (mph)	Saturday Midday Peak Hour Volume						
				2012 Existing	2022 No-Action	2022 Alt A	2022 Alt A Mitigated	2022 Alt B	2022 Alt B Mit	
124	Taunton St W of Rte 18	25.00	35	193	205	205	205	205	205	
125	Bedford 18 S of Taunton St.	0.25	40	783	831	831	831	831	831	
126	Rte 138 N of 495	0.25	40	1,558	1,654	1,654	1,654	1,654	1,654	
127	Rte 138 ramp to 495 NB	0.27	30	358	380	380	380	380	380	
128	495 NB ramp to Rte 138	0.27	30	200	212	212	212	212	212	
129	Rte 138 NB Ramps to SB ramps	0.15	40	1,620	1,721	1,721	1,721	1,721	1,721	
130	Rte 138 ramp to 495 SB	0.27	30	225	239	239	239	239	239	
131	495 SB ramp to 138	0.27	30	399	424	424	424	424	424	
132	Rte 138 S of 495	0.25	40	1,734	1,842	1,842	1,842	1,842	1,842	
133	Padelford St N of 24 SB Ramps	0.25	35	609	649	656	656	656	656	
134	Rte 24 SB Ramp to Padelford St	0.20	30	252	269	272	272	272	272	
135	Rte 24 SB Ramp from Padelford St	0.20	30	69	73	73	73	73	73	
136	Padelford St SB Ramps to NB Ramps	0.29	35	508	540	544	544	544	544	
137	Rte 24 NB Ramp to Padelford St	0.20	30	42	44	44	44	44	44	
138	Rte 24 NB Ramp from Padelford St	0.20	30	241	256	260	260	260	260	
139	Padelford St S of 24 NB Ramps	0.25	35	371	393	393	393	393	393	
140	Bedford St Rte 18 N of Rte 79	0.25	40	766	813	813	813	813	813	
141	Bedford St Rte 18 S of Rte 79	0.25	40	591	627	627	627	627	627	
142	RI Rd Rte 79 W of Rte 18	0.25	40	531	590	643	643	643	643	
143	RI Rd Rte 79 E of Rte 18	0.25	40	462	516	569	569	569	569	
144	Rte 104 Pleasant St W of Rte 24 SB Ramps	0.25	40	761	809	809	809	809	809	
145	Rte 24 SB Ramp to Rte 104	0.28	30	325	345	345	345	345	345	
146	Rte 24 SB Ramp from Rte 104	0.28	30	489	524	530	530	530	530	
147	Rte 104 SB ramps to NB Ramps	0.23	40	1,327	1,414	1,420	1,420	1,420	1,420	
148	Rte 24 NB ramp to Rte 104	0.28	30	503	538	543	543	543	543	
149	Rte 24 NB ramp from Rte 104	0.28	30	294	312	312	312	312	312	
150	Rte 104 Pleasant St E of Rte 24 NB Ramps	0.25	40	1,922	2,050	2,061	2,061	2,061	2,061	
151	Rte 105 S of Rte 495 SB Ramps	0.25	40	1,139	1,227	1,288	1,288	1,288	1,288	
152	Rte 495 SB Ramp to Rte 105	0.20	30	214	227	227	227	227	227	
153	Rte 495 SB Ramp from Rte 105	0.20	30	153	166	179	179	179	179	
154	Rte 105 SB ramps to NB Ramps	0.23	40	1,276	1,378	1,416	1,416	1,416	1,416	
155	Rte 495 NB Ramp to Rte 105	0.20	30	145	158	176	176	176	176	
156	Rte 495 NB Ramp from Rte 105	0.20	30	254	269	269	269	269	269	
157	Rte 105 N of Rte 495 NB Ramps	0.25	40	1,459	1,569	1,588	1,588	1,588	1,588	

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
Link Data

Link Number	Roadway Segment	Link Distance (miles)	Average Speed (mph)	K-factor	Average Daily Traffic (ADT) Volumes					
					2012 Existing	2022 No-Action	2022 Alt A	2022 Alt A Mitigated	2022 Alt B	2022 Alt B Mit
1	Bay St	0.27	35	10.0%	5,240	5,570	5,650	5,650	5,650	5,650
2	Broadway 138 N of Bay St	0.33	40	10.0%	11,960	12,710	12,790	12,790	12,790	12,790
3	Exeter St	0.11	35	10.0%	330	340	340	340	340	340
4	Broadway 138 Exeter to Washington	0.41	40	10.0%	16,410	17,440	17,600	17,600	17,600	17,600
5	Washington E of Broadway	0.17	35	10.0%	4,060	4,320	4,320	4,320	4,320	4,320
6	Washington Court to Broadway	0.31	35	10.0%	9,670	10,250	10,280	10,280	10,280	10,280
7	Broadway 138 Washington to Court	0.29	40	10.0%	10,670	11,370	11,510	11,510	11,510	11,510
8	Washington Court to Martin	0.05	35	10.0%	18,660	19,830	19,830	19,830	19,830	19,830
9	Washington Martin to Tremont	0.10	40	10.0%	17,520	18,660	18,850	18,850	18,850	18,850
10	Washington/Oak S of Tremont	0.15	35	10.0%	9,230	9,800	9,800	9,800	9,800	9,800
11	Tremont W of Washington	0.15	40	10.0%	14,630	15,590	15,770	15,770	15,770	15,770
12	Martin Washington to Cohannet	0.19	35	10.0%	7,700	8,240	8,420	8,420	8,420	8,420
13	Court Washington to PO Square	0.20	35	10.0%	6,910	7,340	7,340	7,340	7,340	7,340
14	PO Square	0.07	35	10.0%	2,710	2,870	2,870	2,870	2,870	2,870
15	Court PO Square to Broadway	0.05	35	10.0%	14,570	15,540	15,700	15,700	15,700	15,700
16	Cohannet PO Square to Martin	0.08	35	10.0%	5,830	6,250	6,430	6,430	6,430	6,430
17	Cohannet Martin to High	0.05	35	10.0%	9,620	10,210	10,210	10,210	10,210	10,210
18	High W of 44	0.11	35	10.0%	10,080	10,710	10,710	10,710	10,710	10,710
19	High E of 44	0.22	35	10.0%	7,760	8,360	8,890	8,890	8,890	8,890
20	Winthrop 44 High to Highland	1.19	40	10.0%	11,810	12,580	13,110	13,110	13,110	13,110
21	Highland W of 44	0.25	35	10.0%	4,570	4,880	4,880	4,880	4,880	4,880
22	Highland E of 44	0.25	35	10.0%	4,370	4,670	4,670	4,670	4,670	4,670
23	Winthrop 44 S of Highland	0.25	40	10.0%	14,760	15,690	16,220	16,220	16,220	16,220
24	Winthrop 44 High to Main	0.19	40	10.0%	8,380	8,890	8,890	8,890	8,890	8,890
25	Weir 138 S of 44	0.25	35	10.0%	8,160	8,660	8,660	8,660	8,660	8,660
26	Broadway 138 Court to 44	0.06	35	10.0%	14,980	15,990	16,120	16,120	16,120	16,120
27	Cohannet PO Square to Broadway	0.09	30	10.0%	13,370	14,200	14,390	14,390	14,390	14,390
28	Main St Broadway to Summer	0.19	35	10.0%	18,640	19,850	20,000	20,000	20,000	20,000
29	Union St	0.13	35	10.0%	500	540	540	540	540	540
30	Summer St 140 Main to Ingell	0.52	40	10.0%	8,150	8,730	9,050	9,050	9,050	9,050
31	Ingell S of Summer 140	0.25	35	10.0%	7,590	8,170	8,700	8,700	8,700	8,700
32	County 140 Ingell to Williams	0.33	40	10.0%	14,500	15,580	16,430	16,430	16,430	16,430
33	44 Union to Longmeadow-Owen	0.72	40	10.0%	16,090	17,110	17,110	17,110	17,110	17,110
34	Longmeadow	0.50	35	10.0%	10,290	11,000	11,060	11,060	11,060	11,060
35	Dean 44 E of Longmeadow-Owen	0.15	40	10.0%	27,230	28,950	29,070	29,070	29,070	29,070
36	Owen Dean to Williams	0.55	35	10.0%	13,070	13,970	14,150	14,150	14,150	14,150
37	Williams N of Owen	0.17	35	10.0%	6,950	7,390	7,390	7,390	7,390	7,390
38	Williams Owen to 140	0.14	35	10.0%	3,550	3,760	3,760	3,760	3,760	3,760
39	Riverway Ext	0.18	35	10.0%	8,130	8,760	8,710	8,710	8,710	8,710
40	County 140 Williams to Riverway	0.12	40	10.0%	10,950	11,820	12,680	12,680	12,680	12,680
41	County 140 Riverway to Johnson	0.52	40	10.0%	17,850	19,270	20,300	20,300	20,300	20,300
42	Johnson N of 140	0.47	35	10.0%	150	160	160	160	160	160
43	Johnson S of 140	0.26	35	10.0%	610	660	660	660	660	660
44	Trucchis Driveway	0.04	20	10.0%	1,530	1,610	1,610	1,610	1,610	1,610
45	County 140 Johnson to Hart	0.27	40	10.0%	17,480	18,890	19,920	19,920	19,920	19,920
46	Hart W of 140	0.15	35	10.0%	9,150	9,750	9,830	9,830	9,830	9,830
47	Hart 140 to Poole	0.73	35	10.0%	7,770	8,470	8,710	8,710	8,710	8,710
48	County 140 Hart to Erika	0.41	40	10.0%	21,930	23,400	24,280	24,280	24,280	24,280
49	Erika Drive	0.14	35	10.0%	13,900	14,770	14,770	14,770	14,770	14,770
50	BPRTHS Driveway S End	0.35	20	10.0%	3,200	3,400	3,400	3,400	3,400	3,400
51	BPRTHS Driveway N End	0.30	20	10.0%	3,580	3,790	3,790	3,790	3,790	3,790
52	Hess Station opposite BPRTHS Driveway	0.02	20	10.0%	2,260	2,410	2,410	2,410	2,410	2,410
53	County 140 Erika to BPRTHS Driveway	0.12	40	10.0%	21,520	22,950	23,830	23,830	23,830	23,830
54	County 140 BPRTHS Driveway to Mozzone	0.21	40	10.0%	21,620	23,060	23,940	23,940	23,940	23,940
55	Mozzone Blvd	0.21	35	10.0%	5,410	5,740	5,740	5,740	5,740	5,740
56	County 140 Mozzone to 24 SB Ramp	0.24	40	10.0%	23,700	25,250	26,130	26,130	25,920	25,920
57	County 140 SB ramp to NB Ramp	0.17	40	10.0%	32,410	35,070	41,850	41,850	39,220	39,220
58	County 140 NB Ramp to Stevens St	0.42	40	10.0%	37,540	41,720	52,130	52,130	48,200	48,200
59	24 SB off/on ramp	0.21	30	10.0%	20,000	21,770	27,670	27,670	25,380	25,380
60	24 NB off/on ramp	0.22	30	10.0%	17,630	19,000	19,890	19,890	19,240	19,240
61	Poole St	0.17	35	10.0%	4,720	5,080	5,200	5,200	5,200	5,200

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
Link Data

Link Number	Roadway Segment	Link Distance (miles)	Average Speed (mph)	K-factor	Average Daily Traffic (ADT) Volumes					
					2012 Existing	2022 No-Action	2022 Alt A	2022 Alt A Mitigated	2022 Alt B	2022 Alt B Mit
62	Middleboro Poole to Stevens	0.47	35	10.0%	9,740	10,630	10,990	10,990	10,990	10,990
63	Stevens Middleboro to Pinehill	0.27	35	10.0%	2,790	3,250	3,610	3,610	3,610	3,610
64	Secondary Site Driveway	0.25	20	10.0%	0	0	1,330	2,040	1,140	1,750
65	Stevens Pinehill to O'Connell	0.60	35	10.0%	7,870	8,820	9,110	9,120	9,110	9,110
66	O'Connell W of Stevens	0.46	35	10.0%	2,780	3,370	17,290	16,580	12,070	11,460
67	Cotley St	0.40	35	10.0%	1,840	4,410	4,410	4,410	4,410	4,410
68	Middleboro Stevens to Pinehill	0.32	35	10.0%	7,120	7,550	7,550	7,550	7,550	7,550
69	Caswell St	0.16	35	10.0%	4,900	5,230	5,210	5,210	5,210	5,210
70	Pinehill Stevens to Middleboro	0.27	35	10.0%	4,290	4,710	5,080	5,080	5,080	5,080
71	Middleboro Caswell to Liberty	0.60	35	10.0%	8,620	9,270	9,620	9,620	9,620	9,620
72	Middleboro E of Liberty	0.19	35	10.0%	4,960	5,260	4,880	4,880	4,880	4,880
73	Liberty S of Middleboro	0.68	35	10.0%	3,470	3,700	3,700	3,700	3,700	3,700
74	Old Colony Ave N of Middleboro	0.19	35	10.0%	8,570	9,220	9,570	9,570	9,570	9,570
75	Stevens S of O'Connell	0.13	35	10.0%	9,440	12,530	26,450	26,450	21,230	21,230
77	Stevens Street Connector	0.24	30	10.0%	12,910	14,500	22,200	22,200	19,230	18,830
78	Galleria Mall Drive N	0.20	35	10.0%	5,810	6,170	6,170	6,170	6,170	6,170
79	Galleria Mall Drive S	0.23	35	10.0%	6,540	6,940	6,940	6,940	6,940	6,940
80	Galleria Mall Drive	0.07	35	10.0%	11,180	11,880	11,880	11,880	11,880	11,880
81	140 NB Ramp to Stevens St Ext	0.23	30	10.0%	1,630	2,290	2,950	2,950	2,460	2,460
82	Steven St Ext Ramp to 140 NB	0.21	30	10.0%	6,380	8,410	13,330	13,330	11,550	11,550
83	140 SB Ramp to Stevens St Connector	0.15	30	10.0%	2,160	4,120	8,450	8,450	5,780	5,780
84	Galleria Mall Dr Ramp to 140 SB	0.17	30	10.0%	2,690	3,360	4,280	4,280	3,980	3,980
85	Stevens St Mall Connector Overpass WB	0.20	30	10.0%	1,760	1,860	1,860	1,860	1,860	1,860
86	Stevens St Mall Connector Overpass EB	0.20	30	10.0%	1,830	1,940	1,940	1,940	1,940	1,940
87	Myricks St 79 S of 140	0.30	40	10.0%	7,520	7,990	7,990	7,990	7,990	7,990
88	Myricks St 79 N of 140	0.30	40	10.0%	9,600	10,540	11,590	11,590	11,590	11,590
89	Myricks St 79 under 140	0.12	40	10.0%	8,560	9,390	9,820	9,820	9,820	9,820
90	140 SB Ramp to Myricks St 79	0.21	30	10.0%	2,850	3,330	3,760	3,760	3,760	3,760
91	Myricks St 79 Ramp to 140 SB	0.24	30	10.0%	1,540	1,630	1,630	1,630	1,630	1,630
92	140 NB Ramp to Myricks St 79	0.17	30	10.0%	1,460	1,550	1,550	1,550	1,550	1,550
93	Myricks St 79 Ramp to 140 NB	0.19	30	10.0%	3,190	3,530	3,840	3,840	3,840	3,840
94	Rte 44 West of Orchard	0.25	40	10.0%	34,470	36,830	37,540	37,540	37,540	37,540
95	Orchard N of 44	0.25	35	10.0%	7,700	8,180	8,180	8,180	8,180	8,180
96	Orchard S of 44	0.25	35	10.0%	7,880	10,210	10,560	10,560	10,560	10,560
97	Rte 44 Orchard to Hill	1.25	40	10.0%	27,860	29,920	30,980	30,980	30,980	30,980
98	Hill N of 44	0.25	35	10.0%	1,230	1,300	1,300	1,300	1,300	1,300
99	Hill S of 44	0.25	35	10.0%	1,390	1,480	1,480	1,480	1,480	1,480
100	Rte 44 Hill to Church	0.46	40	10.0%	20,280	21,800	22,820	22,820	22,820	22,820
101	Church N of 44	0.25	35	10.0%	2,470	2,640	2,620	2,620	2,620	2,620
102	Church S of 44	0.25	35	10.0%	3,150	3,340	3,340	3,340	3,340	3,340
103	Rte 44 Church to Richmond	0.88	40	10.0%	19,900	21,470	22,520	22,520	22,520	22,520
104	Richmond N of 44	0.25	35	10.0%	2,330	2,480	2,470	2,470	2,470	2,470
105	Richmond S of 44	0.25	35	10.0%	890	940	940	940	940	940
106	Rte 44 Richmond to 495 SB ramps	1.18	40	10.0%	17,450	18,880	19,930	19,930	19,930	19,930
107	495 SB Ramps (off) to Rte 44	0.25	30	10.0%	6,270	6,660	6,660	6,660	6,660	6,660
108	495 SB Ramps (on) from Rte 44	0.25	30	10.0%	3,570	3,790	3,790	3,790	3,790	3,790
109	Rte 44 SB Ramps to NB Ramps	0.17	40	10.0%	20,000	21,510	22,040	22,040	22,040	22,040
110	495 NB Ramps (off) to Rte 44	0.25	30	10.0%	2,910	3,090	3,090	3,090	3,090	3,090
111	495 NB Ramps (on) from Rte 44	0.25	30	10.0%	6,530	6,930	6,930	6,930	6,930	6,930
112	Rte 44 NB Ramps to Rotary	0.17	40	10.0%	22,370	24,110	25,160	25,160	25,160	25,160
113	Bedford 28/18 N of Rotary	0.25	40	10.0%	13,950	14,810	14,810	14,810	14,810	14,810
114	Rte 44 E of Rotary	0.25	40	10.0%	17,840	19,300	20,350	20,350	20,350	20,350
115	W. Grove 28 SE of Rotary	0.25	40	10.0%	14,110	15,080	15,080	15,080	15,080	15,080
116	Bedford 18 S of Rotary to 495 NB Ramps	0.17	40	10.0%	10,880	11,560	11,560	11,560	11,560	11,560
117	Bedford 18 S of Rotary NB to SB ramps	0.19	40	10.0%	12,420	13,190	13,190	13,190	13,190	13,190
118	495 NB Ramps (off) to Rte 18	0.28	30	10.0%	2,780	2,950	2,950	2,950	2,950	2,950
119	495 NB Ramps (on) from Rte 18	0.28	30	10.0%	2,770	2,940	2,940	2,940	2,940	2,940
120	495 SB Ramps (off) to Rte 18	0.28	30	10.0%	6,780	7,200	7,200	7,200	7,200	7,200
121	495 SB Ramps (on) from Rte 18	0.28	30	10.0%	1,890	2,010	2,010	2,010	2,010	2,010
122	Bedford 495 SB Ramps to Taunton St	0.46	40	10.0%	13,320	14,130	14,130	14,130	14,130	14,130
123	Taunton St E of Rte 18	0.25	35	10.0%	500	520	520	520	520	520

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
Link Data

Link Number	Roadway Segment	Link Distance (miles)	Average Speed (mph)	K-factor	Average Daily Traffic (ADT) Volumes					
					2012 Existing	2022 No-Action	2022 Alt A	2022 Alt A Mitigated	2022 Alt B	2022 Alt B Mit
124	Taunton St W of Rte 18	25.00	35	10.0%	2,510	2,660	2,660	2,660	2,660	2,660
125	Bedford 18 S of Taunton St.	0.25	40	10.0%	9,950	10,560	10,560	10,560	10,560	10,560
126	Rte 138 N of 495	0.25	40	10.0%	22,330	23,710	23,710	23,710	23,710	23,710
127	Rte 138 ramp to 495 NB	0.27	30	10.0%	5,400	5,730	5,730	5,730	5,730	5,730
128	495 NB ramp to Rte 138	0.27	30	10.0%	3,150	3,350	3,350	3,350	3,350	3,350
129	Rte 138 NB Ramps to SB ramps	0.15	40	10.0%	23,030	24,450	24,450	24,450	24,450	24,450
130	Rte 138 ramp to 495 SB	0.27	30	10.0%	3,360	3,560	3,560	3,560	3,560	3,560
131	495 SB ramp to 138	0.27	30	10.0%	6,950	7,380	7,380	7,380	7,380	7,380
132	Rte 138 S of 495	0.25	40	10.0%	24,460	25,970	25,970	25,970	25,970	25,970
133	Padelford St N of 24 SB Ramps	0.25	35	10.0%	7,670	8,170	8,310	8,310	8,310	8,310
134	Rte 24 SB Ramp to Padelford St	0.20	30	10.0%	4,240	4,530	4,590	4,590	4,590	4,590
135	Rte 24 SB Ramp from Padelford St	0.20	30	10.0%	810	860	860	860	860	860
136	Padelford St SB Ramps to NB Ramps	0.29	35	10.0%	5,150	5,480	5,550	5,550	5,550	5,550
137	Rte 24 NB Ramp to Padelford St	0.20	30	10.0%	740	780	780	780	780	780
138	Rte 24 NB Ramp from Padelford St	0.20	30	10.0%	4,400	4,700	4,700	4,700	4,700	4,700
139	Padelford St S of 24 NB Ramps	0.25	35	10.0%	4,070	4,310	4,030	4,030	4,030	4,030
140	Bedford St Rte 18 N of Rte 79	0.25	40	10.0%	11,070	11,750	11,250	11,250	11,250	11,250
141	Bedford St Rte 18 S of Rte 79	0.25	40	10.0%	7,360	7,810	7,810	7,810	7,810	7,810
142	Rl Rd Rte 79 W of Rte 18	0.25	40	10.0%	7,820	8,650	9,700	9,700	9,700	9,700
143	Rl Rd Rte 79 E of Rte 18	0.25	40	10.0%	6,210	6,930	7,480	7,480	7,480	7,480
144	Rte 104 Pleasant St W of Rte 24 SB Ramps	0.25	40	10.0%	13,520	11,820	11,820	11,820	11,820	11,820
145	Rte 24 SB Ramp to Rte 104	0.28	30	10.0%	7,040	7,470	7,470	7,470	7,470	7,470
146	Rte 24 SB Ramp from Rte 104	0.28	30	10.0%	7,520	8,090	8,040	8,040	8,040	8,040
147	Rte 104 SB ramps to NB Ramps	0.23	40	10.0%	17,790	18,890	19,040	19,040	19,040	19,040
148	Rte 24 NB ramp to Rte 104	0.28	30	10.0%	7,040	7,580	7,670	7,670	7,670	7,670
149	Rte 24 NB ramp from Rte 104	0.28	30	10.0%	5,260	5,580	5,580	5,580	5,580	5,580
150	Rte 104 Pleasant St E of Rte 24 NB Ramps	0.25	40	10.0%	24,690	26,320	26,560	26,560	26,560	26,560
151	Rte 105 S of Rte 495 SB Ramps	0.25	40	10.0%	14,230	15,470	16,520	16,520	16,520	16,520
152	Rte 495 SB Ramp to Rte 105	0.20	30	10.0%	4,810	5,110	5,110	5,110	5,110	5,110
153	Rte 495 SB Ramp from Rte 105	0.20	30	10.0%	1,900	2,100	2,380	2,380	2,380	2,380
154	Rte 105 SB ramps to NB Ramps	0.23	40	10.0%	15,420	16,650	17,420	17,420	17,420	17,420
155	Rte 495 NB Ramp to Rte 105	0.20	30	10.0%	2,030	2,230	2,240	2,240	2,240	2,240
156	Rte 495 NB Ramp from Rte 105	0.20	30	10.0%	6,150	6,530	6,530	6,530	6,530	6,530
157	Rte 105 N of Rte 495 NB Ramps	0.25	40	10.0%	16,920	20,220	18,610	18,610	18,610	18,610

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2012 Existing

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
1	**Bay St**	5,240	0.27	1414.8	35	0.02	5.530	0.325	1.031	0.161	3.398	0.733	2.297	0.358	1403.250	561.300	1755.263	273.821
2	**Broadway 138 N of Bay St**	11,960	0.33	3946.8	40	0.02	5.530	0.317	2.799	0.437	3.398	0.750	6.551	1.022	1403.250	561.300	4894.289	763.509
3	**Exeter St**	330	0.11	36.3	35	0.02	5.530	0.325	0.027	0.004	3.398	0.733	0.059	0.009	1403.250	561.300	45.203	7.052
4	**Broadway 138 Exeter to Washington**	16,410	0.41	6728.1	40	0.02	5.530	0.317	4.758	0.742	3.398	0.750	11.159	1.741	1403.250	561.300	8339.864	1301.019
5	**Washington E of Broadway**	4,060	0.17	690.2	35	0.02	5.530	0.325	0.508	0.079	3.398	0.733	1.124	0.175	1403.250	561.300	857.585	133.783
6	**Washington Court to Broadway**	9,670	0.31	2997.7	35	0.02	5.530	0.325	2.181	0.340	3.398	0.733	4.864	0.759	1403.250	561.300	3717.847	579.984
7	**Broadway 138 Washington to Court**	10,670	0.29	3094.3	40	0.02	5.530	0.317	2.199	0.343	3.398	0.750	5.139	0.802	1403.250	561.300	3838.245	598.766
8	**Washington Court to Martin**	18,660	0.05	933.0	35	0.02	5.530	0.325	0.732	0.114	3.398	0.733	1.547	0.241	1403.250	561.300	1170.587	182.612
9	**Washington Martin to Tremont**	17,520	0.10	1752.0	40	0.02	5.530	0.317	1.284	0.200	3.398	0.750	2.933	0.458	1403.250	561.300	2183.088	340.562
10	**Washington/Oak S of Tremont**	9,230	0.15	1384.5	35	0.02	5.530	0.325	1.023	0.160	3.398	0.733	2.257	0.352	1403.250	561.300	1721.197	268.507
11	**Tremont W of Washington**	14,630	0.15	2194.5	40	0.02	5.530	0.317	1.583	0.247	3.398	0.750	3.659	0.571	1403.250	561.300	2728.181	425.596
12	**Martin Washington to Cohannet**	7,700	0.19	1463.0	35	0.02	5.530	0.325	1.074	0.168	3.398	0.733	2.380	0.371	1403.250	561.300	1817.023	283.456
13	**Court Washington to PO Square**	6,910	0.20	1382.0	35	0.02	5.530	0.325	1.014	0.158	3.398	0.733	2.248	0.351	1403.250	561.300	1716.109	267.713
14	**PO Square**	2,710	0.07	189.7	35	0.02	5.530	0.325	0.145	0.023	3.398	0.733	0.312	0.049	1403.250	561.300	237.075	36.984
15	**Court PO Square to Broadway**	14,570	0.05	728.5	35	0.02	5.530	0.325	0.571	0.089	3.398	0.733	1.208	0.188	1403.250	561.300	914.011	142.586
16	**Cohannet PO Square to Martin**	5,830	0.08	466.4	35	0.02	5.530	0.325	0.354	0.055	3.398	0.733	0.766	0.119	1403.250	561.300	582.162	90.817
17	**Cohannet Martin to High**	9,620	0.05	481.0	35	0.02	5.530	0.325	0.377	0.059	3.398	0.733	0.797	0.124	1403.250	561.300	603.486	94.144
18	**High W of 44**	10,080	0.11	1108.8	35	0.02	5.530	0.325	0.829	0.129	3.398	0.733	1.813	0.283	1403.250	561.300	1380.759	215.398
19	**High E of 44**	7,760	0.22	1707.2	35	0.02	5.530	0.325	1.249	0.195	3.398	0.733	2.775	0.433	1403.250	561.300	2119.262	330.605
20	**Winthrop 44 High to Highland**	11,810	1.19	14053.9	40	0.02	5.530	0.317	9.862	1.538	3.398	0.750	23.262	3.629	1403.250	561.300	17401.304	2714.603
21	**Highland W of 44**	4,570	0.25	1142.5	35	0.02	5.530	0.325	0.834	0.130	3.398	0.733	1.856	0.290	1403.250	561.300	1417.727	221.165
22	**Highland E of 44**	4,370	0.25	1092.5	35	0.02	5.530	0.325	0.798	0.124	3.398	0.733	1.775	0.277	1403.250	561.300	1355.682	211.486
23	**Winthrop 44 S of Highland**	14,760	0.25	3690.0	40	0.02	5.530	0.317	2.629	0.410	3.398	0.750	6.132	0.957	1403.250	561.300	4578.916	714.311
24	**Winthrop 44 High to Main**	8,380	0.19	1592.2	40	0.02	5.530	0.317	1.141	0.178	3.398	0.750	2.650	0.413	1403.250	561.300	1977.487	308.488
25	**Weir 138 S of 44**	8,160	0.25	2040.0	35	0.02	5.530	0.325	1.489	0.232	3.398	0.733	3.314	0.517	1403.250	561.300	2531.433	394.904
26	**Broadway 138 Court to 44**	14,980	0.06	898.8	35	0.02	5.530	0.325	0.695	0.108	3.398	0.733	1.484	0.231	1403.250	561.300	1125.103	175.516
27	**Cohannet PO Square to Broadway**	13,370	0.09	1203.3	30	0.02	5.530	0.341	0.950	0.148	3.398	0.739	1.988	0.310	1403.250	561.300	1500.526	234.082
28	**Main St Broadway to Summer**	18,640	0.19	3541.6	35	0.02	5.530	0.325	2.601	0.406	3.398	0.733	5.762	0.899	1403.250	561.300	4398.611	686.183
29	**Union St**	500	0.13	65.0	35	0.02	5.530	0.325	0.048	0.008	3.398	0.733	0.106	0.017	1403.250	561.300	80.865	12.615
30	**Summer St 140 Main to Ingell**	8,150	0.52	4238.0	40	0.02	5.530	0.317	2.989	0.466	3.398	0.750	7.024	1.096	1403.250	561.300	5251.364	819.213
31	**Ingell S of Summer 140**	7,590	0.25	1897.5	35	0.02	5.530	0.325	1.385	0.216	3.398	0.733	3.082	0.481	1403.250	561.300	2354.605	367.318
32	**County 140 Ingell to Williams**	14,500	0.33	4785.0	40	0.02	5.530	0.317	3.393	0.529	3.398	0.750	7.942	1.239	1403.250	561.300	5933.712	925.659
33	**44 Union to Longmeadow-Owen**	16,090	0.72	11584.8	40	0.02	5.530	0.317	8.151	1.272	3.398	0.750	19.189	2.993	1403.250	561.300	14349.567	2238.532
34	**Longmeadow**	10,290	0.50	5145.0	35	0.02	5.530	0.325	3.721	0.581	3.398	0.733	8.336	1.300	1403.250	561.300	6375.580	994.591
35	**Dean 44 E of Longmeadow-Owen**	27,230	0.15	4084.5	40	0.02	5.530	0.317	2.947	0.460	3.398	0.750	6.810	1.062	1403.250	561.300	5077.810	792.138
36	**Owen Dean to Williams**	13,070	0.55	7188.5	35	0.02	5.530	0.325	5.195	0.810	3.398	0.733	11.644	1.816	1403.250	561.300	8906.721	1389.448
37	**Williams N of Owen**	6,950	0.17	1181.5	35	0.02	5.530	0.325	0.870	0.136	3.398	0.733	1.924	0.300	1403.250	561.300	1468.033	229.013
38	**Williams Owen to 140**	3,550	0.14	497.0	35	0.02	5.530	0.325	0.368	0.057	3.398	0.733	0.811	0.126	1403.250	561.300	618.069	96.419
39	**Riverway Ext**	8,130	0.18	1463.4	35	0.02	5.530	0.325	1.076	0.168	3.398	0.733	2.382	0.372	1403.250	561.300	1817.887	283.590
40	**County 140 Williams to Riverway**	10,950	0.12	1314.0	40	0.02	5.530	0.317	0.955	0.149	3.398	0.750	2.195	0.342	1403.250	561.300	1635.434	255.128
41	**County 140 Riverway to Johnson**	17,850	0.52	9282.0	40	0.02	5.530	0.317	6.547	1.021	3.398	0.750	15.385	2.400	1403.250	561.300	11501.454	1794.227
42	**Johnson N of 140**	150	0.47	70.5	35	0.02	5.530	0.325	0.051	0.008	3.398	0.733	0.114	0.018	1403.250	561.300	87.370	13.630
43	**Johnson S of 140**	610	0.26	158.6	35	0.02	5.530	0.325	0.116	0.018	3.398	0.733	0.258	0.040	1403.250	561.300	196.786	30.699
44	**Trucchis Driveway**	1,530	0.04	61.2	20	0.02	5.530	0.399	0.059	0.009	3.398	0.812	0.113	0.018	1403.250	561.300	77.047	12.019
45	**County 140 Johnson to Hart**	17,480	0.27	4719.6	40	0.02	5.530	0.317	3.358	0.524	3.398	0.750	7.840	1.223	1403.250	561.300	5855.343	913.434
46	**Hart W of 140**	9,150	0.15	1372.5	35	0.02	5.530	0.325	1.014	0.158	3.398	0.733	2.237	0.349	1403.250	561.300	1706.278	266.179
47	**Hart 140 to Poole**	7,770	0.73	5672.1	35	0.02	5.530	0.325	4.090	0.638	3.398	0.733	9.182	1.432	1403.250	561.300	7025.680	1096.006
48	**County 140 Hart to Erika**	21,930	0.41	8991.3	40	0.02	5.530	0.317	6.358	0.992	3.398	0.750	14.913	2.326	1403.250	561.300	11145.230	1738.656
49	**Erika Drive**	13,900	0.14	1946.0	35	0.02	5.530	0.325	1.441	0.225	3.398	0.733	3.174	0.495	1403.250	561.300	2420.044	377.527
50	**BPRTHS Driveway S End**	3,200	0.35	1120.0	20	0.02	5.530	0.399	0.996	0.155	3.398	0.812	2.012	0.314	1403.250	561.300	1388.706	216.638
51	**BPRTHS Driveway N End**	3,580	0.30	1074.0	20	0.02	5.530	0.399	0.957	0.149	3.398	0.812	1.930	0.301	1403.250	561.300	1332.110	207.809
52	**Hess Station opposite BPRTHS Driveway**	2,260	0.02	45.2	20	0.02	5.530	0.399	0.047	0.007	3.398	0.812	0.086	0.013	1403.250	561.300	57.875	9.029
53	**County 140 Erika to BPRTHS Driveway**	21,520	0.12	2582.4	40	0.02	5.530	0.317	1.878	0.293	3.398	0.750	4.315	0.673	1403.250	561.300	3214.113	501.402
54	**County 140 BPRTHS Driveway to Mozzone**	21,620	0.21	4540.2	40	0.02	5.530	0.317	3.246	0.506	3.398	0.750	7.552	1.178	1403.250	561.300	5636.900	879.356
55	**Mozzone Blvd**	5,410	0.21	1136.1	35	0.02	5.530	0.325	0.832	0.130	3.398	0.733	1.847	0.288	1403.250	561.300	1410.529	220.042
56	**County 140 Mozzone to 24 SB Ramp**	23,700	0.24	5688.0	40	0.02	5.530	0.317	4.055	0.633	3.398	0.750	9.454	1.475	1403.250	561.300	7059.046	1101.211
57	**County 140 SB ramp to NB Ramp**	32,410	0.17	5509.7	40	0.02	5.530	0.317	3.960	0.618	3.398	0.750	9.178	1.432	1403.250	561.300	6845.891	1067.959
58	**County 140 NB Ramp to Stevens St**	37,540	0.42	15766.8	40	0.02	5.530	0.317	11.146	1.739	3.398	0.750	26.148	4.079	1403.250	561.300	19543.062	3048.718
59	**24 SB off/on ramp**	20,000	0.21	4200.0	30	0.02	5.530	0.341	3.225	0.503	3.398	0.739	6.884	1.074	1403.250	561.300	5214.524	813.466
60	**24 NB off/on ramp**	17,630	0.22	3878.6	30	0.02	5.530	0.341	2.976	0.464	3.398	0.739	6.356	0.992	1403.250	561.300	4814.767	751.104
61	**Poole St**	4,720	0.17	802.4	35	0.02	5.530	0.325	0.591	0.092	3.398	0.733	1.306	0.204	1403.250	561.300	996.995	155.531
62	**Middleboro Poole to Stevens**	9,740	0.47	4577.8	35	0.02	5.530	0.325	3.313	0.517	3.398	0.733	7.418	1.157	1403.250	561.300	5673.220	885.022
63	**Stevens Middleboro to Pinehill**	2,790	0.27	753.3	35	0.02	5.530	0.325	0.549	0.086	3.398	0.733	1.223	0.191	1403.250	561.300	934.577	145.794
64	**Secondary Site Driveway**	0	0.25	0.0	20	0.02	5.530	0.399	0.000	0.000	3.398	0.812	0.000	0.000	1403.250	561.300	0.000	0.000
65	**Stevens Pinehill to O'Connell**	7,870	0.60	4722.0	35	0.02	5.530	0.325	3.410	0.532	3.398	0.733	7.647	1.193	1403.250	561.300	5850.055	912.609
66	**O'Connell W of Stevens**	2,780	0.46	1278.8	35	0.02	5.530	0.325	0.926	0.144	3.398	0.733	2.072	0.323	1403.250	561.300	1584.854	247.237
67	**Cotley St**	1,840	0.40	736.0	35	0.02	5.530	0.325	0.534	0.083	3.398	0.733	1.193	0.186	1403.250	561.300	912.353	142.327
68	**Middleboro Stevens to Pinehill**	7,120	0.32	2278.4	35	0.02	5.530	0.325	1.657	0.258	3.398	0.733	3.697	0.577	1403.250	561.300	2825.550	440.786
69	**Caswell St**	4,900	0.16	784.0	35	0.02	5.530	0.325	0.578	0.090	3.398	0.733	1.277	0.199	1403.250	561.300	974.380	152.003
70	**Pinehill Stevens to Middleboro**	4,290	0.27	1158.3	35	0.02	5.530	0.325	0.844	0.132	3.398	0.733	1.881	0.293	1403.250	561.300	1437.038	224.178
71	**Middleboro Caswell to Liberty**	8,620	0.60	5172.0	35	0.02	5.530	0.325	3.735	0.583	3.398	0.733	8.376	1.307	1403.250	561.300	6407.557	999.579
72	**Middleboro E of Liberty**	4,960	0.19	942.4	35	0.02	5.530	0.325	0.692	0.108	3.398	0.733	1.533	0.239	1403.250	561.300	1170.446	182.590

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2012 Existing

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
73	**Liberty S of Middleboro**	3,470	0.68	2359.6	35	0.02	5.530	0.325	1.702	0.266	3.398	0.733	3.820	0.596	1403.250	561.300	2922.895	455.972
74	**Old Colony Ave N of Middleboro**	8,570	0.19	1628.3	35	0.02	5.530	0.325	1.196	0.187	3.398	0.733	2.649	0.413	1403.250	561.300	2022.323	315.482
75	**Stevens S of O'Connell**	9,440	0.13	1227.2	35	0.02	5.530	0.325	0.911	0.142	3.398	0.733	2.003	0.312	1403.250	561.300	1526.725	238.169
76	**New Ramp**	0	0.10	0.0	30	0.02	5.530	0.341	0.000	0.000	3.398	0.739	0.000	0.000	1403.250	561.300	0.000	0.000
77	**Stevens Street Connector**	12,910	0.24	3098.4	30	0.02	5.530	0.341	2.373	0.370	3.398	0.739	5.075	0.792	1403.250	561.300	3845.244	599.858
78	**Galleria Mall Drive N**	5,810	0.20	1162.0	35	0.02	5.530	0.325	0.852	0.133	3.398	0.733	1.890	0.295	1403.250	561.300	1442.923	225.096
79	**Galleria Mall Drive S**	6,540	0.23	1504.2	35	0.02	5.530	0.325	1.100	0.172	3.398	0.733	2.444	0.381	1403.250	561.300	1867.009	291.253
80	**Galleria Mall Drive**	11,180	0.07	782.6	35	0.02	5.530	0.325	0.599	0.093	3.398	0.733	1.288	0.201	1403.250	561.300	978.045	152.575
81	**140 NB Ramp to Stevens St Ext**	1,630	0.23	374.9	30	0.02	5.530	0.341	0.287	0.045	3.398	0.739	0.614	0.096	1403.250	561.300	465.325	72.591
82	**Steven St Ext Ramp to 140 NB**	6,380	0.21	1339.8	30	0.02	5.530	0.341	1.029	0.160	3.398	0.739	2.196	0.343	1403.250	561.300	1663.433	259.496
83	**140 SB Ramp to Stevens St Connector**	2,160	0.15	324.0	30	0.02	5.530	0.341	0.251	0.039	3.398	0.739	0.532	0.083	1403.250	561.300	402.794	62.836
84	**Galleria Mall Dr Ramp to 140 SB**	2,690	0.17	457.3	30	0.02	5.530	0.341	0.353	0.055	3.398	0.739	0.751	0.117	1403.250	561.300	568.203	88.640
85	**Stevens St Mall Connector Overpass WB**	1,760	0.20	352.0	30	0.02	5.530	0.341	0.271	0.042	3.398	0.739	0.577	0.090	1403.250	561.300	437.099	68.187
86	**Stevens St Mall Connector Overpass EB**	1,830	0.20	366.0	30	0.02	5.530	0.341	0.281	0.044	3.398	0.739	0.600	0.094	1403.250	561.300	454.483	70.899
87	**Myricks St 79 S of 140**	7,520	0.30	2256.0	40	0.02	5.530	0.317	1.602	0.250	3.398	0.750	3.746	0.584	1403.250	561.300	2798.175	436.515
88	**Myricks St 79 N of 140**	9,600	0.30	2880.0	40	0.02	5.530	0.317	2.045	0.319	3.398	0.750	4.782	0.746	1403.250	561.300	3572.138	557.254
89	**Myricks St 79 under 140**	8,560	0.12	1027.2	40	0.02	5.530	0.317	0.747	0.117	3.398	0.750	1.716	0.268	1403.250	561.300	1278.476	199.442
90	**140 SB Ramp to Myricks St 79**	2,850	0.21	598.5	30	0.02	5.530	0.341	0.460	0.072	3.398	0.739	0.981	0.153	1403.250	561.300	743.070	115.919
91	**Myricks St 79 Ramp to 140 SB**	1,540	0.24	369.6	30	0.02	5.530	0.341	0.283	0.044	3.398	0.739	0.605	0.094	1403.250	561.300	458.689	71.555
92	**140 NB Ramp to Myricks St 79**	1,460	0.17	248.2	30	0.02	5.530	0.341	0.192	0.030	3.398	0.739	0.407	0.064	1403.250	561.300	308.393	48.109
93	**Myricks St 79 Ramp to 140 NB**	3,190	0.19	606.1	30	0.02	5.530	0.341	0.466	0.073	3.398	0.739	0.994	0.155	1403.250	561.300	752.767	117.432
94	**Rte 44 West of Orchard**	34,470	0.25	8617.5	40	0.02	5.530	0.317	6.139	0.958	3.398	0.750	14.321	2.234	1403.250	561.300	10693.443	1668.177
95	**Orchard N of 44**	7,700	0.25	1925.0	35	0.02	5.530	0.325	1.405	0.219	3.398	0.733	3.127	0.488	1403.250	561.300	2388.730	372.642
96	**Orchard S of 44**	7,880	0.25	1970.0	35	0.02	5.530	0.325	1.438	0.224	3.398	0.733	3.200	0.499	1403.250	561.300	2444.570	381.353
97	**Rte 44 Orchard to Hill**	27,860	1.25	34825.0	40	0.02	5.530	0.317	24.432	3.811	3.398	0.750	57.640	8.992	1403.250	561.300	43118.526	6726.490
98	**Hill N of 44**	1,230	0.25	307.5	35	0.02	5.530	0.325	0.224	0.035	3.398	0.733	0.499	0.078	1403.250	561.300	381.576	59.526
99	**Hill S of 44**	1,390	0.25	347.5	35	0.02	5.530	0.325	0.254	0.040	3.398	0.733	0.564	0.088	1403.250	561.300	431.212	67.269
100	**Rte 44 Hill to Church**	20,280	0.46	9328.8	40	0.02	5.530	0.317	6.588	1.028	3.398	0.750	15.467	2.413	1403.250	561.300	11561.455	1803.587
101	**Church N of 44**	2,470	0.25	617.5	35	0.02	5.530	0.325	0.451	0.070	3.398	0.733	1.003	0.156	1403.250	561.300	766.255	119.536
102	**Church S of 44**	3,150	0.25	787.5	35	0.02	5.530	0.325	0.575	0.090	3.398	0.733	1.279	0.200	1403.250	561.300	977.208	152.444
103	**Rte 44 Church to Richmond**	19,900	0.88	17512.0	40	0.02	5.530	0.317	12.306	1.920	3.398	0.750	28.997	4.524	1403.250	561.300	21687.521	3383.253
104	**Richmond N of 44**	2,330	0.25	582.5	35	0.02	5.530	0.325	0.425	0.066	3.398	0.733	0.946	0.148	1403.250	561.300	722.823	112.760
105	**Richmond S of 44**	890	0.25	222.5	35	0.02	5.530	0.325	0.162	0.025	3.398	0.733	0.361	0.056	1403.250	561.300	276.100	43.072
106	**Rte 44 Richmond to 495 SB ramps**	17,450	1.18	20591.0	40	0.02	5.530	0.317	14.450	2.254	3.398	0.750	34.083	5.317	1403.250	561.300	25495.558	3977.307
107	**495 SB Ramps (off) to Rte 44**	6,270	0.25	1567.5	30	0.02	5.530	0.341	1.200	0.187	3.398	0.739	2.567	0.400	1403.250	561.300	1945.108	303.437
108	**495 SB Ramps (on) from Rte 44**	3,570	0.25	892.5	30	0.02	5.530	0.341	0.683	0.107	3.398	0.739	1.462	0.228	1403.250	561.300	1107.502	172.770
109	**Rte 44 SB Ramps to NB Ramps**	20,000	0.17	3400.0	40	0.02	5.530	0.317	2.444	0.381	3.398	0.750	5.663	0.883	1403.250	561.300	4224.555	659.031
110	**495 NB Ramps (off) to Rte 44**	2,910	0.25	727.5	30	0.02	5.530	0.341	0.557	0.087	3.398	0.739	1.191	0.186	1403.250	561.300	902.754	140.830
111	**495 NB Ramps (on) from Rte 44**	6,530	0.25	1632.5	30	0.02	5.530	0.341	1.249	0.195	3.398	0.739	2.673	0.417	1403.250	561.300	2025.767	316.020
112	**Rte 44 NB Ramps to Rotary**	22,370	0.17	3802.9	40	0.02	5.530	0.317	2.733	0.426	3.398	0.750	6.335	0.988	1403.250	561.300	4725.165	737.126
113	**Bedford 28/18 N of Rotary**	13,950	0.25	3487.5	40	0.02	5.530	0.317	2.485	0.388	3.398	0.750	5.796	0.904	1403.250	561.300	4327.634	675.111
114	**Rte 44 E of Rotary**	17,840	0.25	4460.0	40	0.02	5.530	0.317	3.177	0.496	3.398	0.750	7.412	1.156	1403.250	561.300	5534.407	863.368
115	**W. Grove 28 SE of Rotary**	14,110	0.25	3527.5	40	0.02	5.530	0.317	2.513	0.392	3.398	0.750	5.862	0.914	1403.250	561.300	4377.270	682.854
116	**Bedford 18 S of Rotary to 495 NB Ramps**	10,880	0.17	1849.6	40	0.02	5.530	0.317	1.329	0.207	3.398	0.750	3.081	0.481	1403.250	561.300	2298.158	358.513
117	**Bedford 18 S of Rotary NB to SB ramps**	12,420	0.19	2359.8	40	0.02	5.530	0.317	1.691	0.264	3.398	0.750	3.928	0.613	1403.250	561.300	2930.834	457.210
118	**495 NB Ramps (off) to Rte 18**	2,780	0.28	778.4	30	0.02	5.530	0.341	0.595	0.093	3.398	0.739	1.274	0.199	1403.250	561.300	965.629	150.638
119	**495 NB Ramps (on) from Rte 18**	2,770	0.28	775.6	30	0.02	5.530	0.341	0.592	0.092	3.398	0.739	1.269	0.198	1403.250	561.300	962.155	150.096
120	**495 SB Ramps (off) to Rte 18**	6,780	0.28	1898.4	30	0.02	5.530	0.341	1.450	0.226	3.398	0.739	3.107	0.485	1403.250	561.300	2355.023	367.384
121	**495 SB Ramps (on) from Rte 18**	1,890	0.28	529.2	30	0.02	5.530	0.341	0.404	0.063	3.398	0.739	0.866	0.135	1403.250	561.300	656.489	102.412
122	**Bedford 495 SB Ramps to Taunton St**	13,320	0.46	6127.2	40	0.02	5.530	0.317	4.327	0.675	3.398	0.750	10.159	1.585	1403.250	561.300	7593.618	1184.604
123	**Taunton St E of Rte 18**	500	0.25	125.0	35	0.02	5.530	0.325	0.091	0.014	3.398	0.733	0.203	0.032	1403.250	561.300	155.112	24.198
124	**Taunton St W of Rte 18**	2,510	25.00	62750.0	35	0.02	5.530	0.325	44.969	7.015	3.398	0.733	101.409	15.820	1403.250	561.300	77652.844	12113.844
125	**Bedford 18 S of Taunton St.**	9,950	0.25	2487.5	40	0.02	5.530	0.317	1.772	0.276	3.398	0.750	4.134	0.645	1403.250	561.300	3086.735	481.531
126	**Rte 138 N of 495**	22,330	0.25	5582.5	40	0.02	5.530	0.317	3.977	0.620	3.398	0.750	9.277	1.447	1403.250	561.300	6927.316	1080.661
127	**Rte 138 ramp to 495 NB**	5,400	0.27	1458.0	30	0.02	5.530	0.341	1.114	0.174	3.398	0.739	2.387	0.372	1403.250	561.300	1808.859	282.182
128	**495 NB ramp to Rte 138**	3,150	0.27	850.5	30	0.02	5.530	0.341	0.650	0.101	3.398	0.739	1.392	0.217	1403.250	561.300	1055.168	164.606
129	**Rte 138 NB Ramps to SB ramps**	23,030	0.15	3454.5	40	0.02	5.530	0.317	2.492	0.389	3.398	0.750	5.760	0.899	1403.250	561.300	4294.600	669.958
130	**Rte 138 ramp to 495 SB**	3,360	0.27	907.2	30	0.02	5.530	0.341	0.693	0.108	3.398	0.739	1.485	0.232	1403.250	561.300	1125.512	175.580
131	**495 SB ramp to 138**	6,950	0.27	1876.5	30	0.02	5.530	0.341	1.434	0.224	3.398	0.739	3.072	0.479	1403.250	561.300	2328.068	363.179
132	**Rte 138 S of 495**	24,460	0.25	6115.0	40	0.02	5.530	0.317	4.356	0.680	3.398	0.750	10.162	1.585	1403.250	561.300	7588.095	1183.743
133	**Padelford St N of 24 SB Ramps**	7,670	0.25	1917.5	35	0.02	5.530	0.325	1.400	0.218	3.398	0.733	3.115	0.486	1403.250	561.300	2379.423	371.190
134	**Rte 24 SB Ramp to Padelford St**	4,240	0.20	848.0	30	0.02	5.530	0.341	0.652	0.102	3.398	0.739	1.390	0.217	1403.250	561.300	1053.011	164.270
135	**Rte 24 SB Ramp from Padelford St**	810	0.20	162.0	30	0.02	5.530	0.341	0.125	0.019	3.398	0.739	0.266	0.041	1403.250	561.300	201.165	31.382
136	**Padelford St SB Ramps to NB Ramps**	5,150	0.29	1493.5	35	0.02	5.530	0.325	1.088	0.170	3.398	0.733	2.424	0.378	1403.250	561.300	1852.574	289.002
137	**Rte 24 NB Ramp to Padelford St**	740	0.20	148.0	30	0.02	5.530	0.341	0.114	0.018	3.398	0.739	0.243	0.038	1403.250	561.300	183.780	28.670
138	**Rte 24 NB Ramp from Padelford St**	4,400	0.20	880.0	30	0.02	5.530	0.341	0.676	0.106	3.398	0.739	1.443	0.225	1403.250	561.300	1092.747	170.469
139	**Padelford St S of 24 NB Ramps**	4,070	0.25	1017.5	35	0.02	5.530	0.325	0.743	0.116	3.398	0.733	1.653	0.258	1403.250	561.300	1262.614	196.968
140	**Bedford St Rte 18 N of Rte 79**	11,070	0.25	2767.5	40	0.02	5.530	0.317	1.972	0.308	3.398	0.750	4.599	0.717	1403.250	561.300	3434.187	535.733
141	**Bedford St Rte 18 S of Rte 79**	7,360	0.25	1840.0	40	0.02	5.530	0.317	1.311	0.204	3.398	0.750	3.058	0.477	1403.250	561.300	2283.253	356.188
142	**RI Rd Rte 79 W of Rte 18**	7,820	0.25	1955.0	40	0.02	5.530	0.317	1.393	0.217	3.398	0.750	3.249	0.507	1403.250	561.300	2425.957	378.449
143	**RI Rd Rte 79 E of Rte 18**	6,210	0.25	1552.5	40	0.02	5.530	0.317	1.106	0.173	3.398	0.750	2.580	0.402	1403.250	561.300	1926.495	300.533
144	**Rte 104 Pleasant St W of Rte 24 SB Ramps**	13,520	0.25	3380.0	40	0.02	5.530	0.317	2.408	0.376	3.398	0.750	5.617	0.876	1403.250	561.300	4194.237	654.301

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2012 Existing

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
145	**Rte 24 SB Ramp to Rte 104**	7,040	0.28	1971.2	30	0.02	5.530	0.341	1.506	0.235	3.398	0.739	3.226	0.503	1403.250	561.300	2445.333	381.472
146	**Rte 24 SB Ramp from Rte 104**	7,520	0.28	2105.6	30	0.02	5.530	0.341	1.608	0.251	3.398	0.739	3.446	0.538	1403.250	561.300	2612.060	407.481
147	**Rte 104 SB ramps to NB Ramps**	17,790	0.23	4091.7	40	0.02	5.530	0.317	2.920	0.455	3.398	0.750	6.803	1.061	1403.250	561.300	5078.608	792.263
148	**Rte 24 NB ramp to Rte 104**	7,040	0.28	1971.2	30	0.02	5.530	0.341	1.506	0.235	3.398	0.739	3.226	0.503	1403.250	561.300	2445.333	381.472
149	**Rte 24 NB ramp from Rte 104**	5,260	0.28	1472.8	30	0.02	5.530	0.341	1.125	0.176	3.398	0.739	2.410	0.376	1403.250	561.300	1827.053	285.020
150	**Rte 104 Pleasant St E of Rte 24 NB Ramps**	24,690	0.25	6172.5	40	0.02	5.530	0.317	4.397	0.686	3.398	0.750	10.257	1.600	1403.250	561.300	7659.446	1194.874
151	**Rte 105 S of Rte 495 SB Ramps**	14,230	0.25	3557.5	40	0.02	5.530	0.317	2.534	0.395	3.398	0.750	5.912	0.922	1403.250	561.300	4414.497	688.661
152	**Rte 495 SB Ramp to Rte 105**	4,810	0.20	962.0	30	0.02	5.530	0.341	0.740	0.115	3.398	0.739	1.577	0.246	1403.250	561.300	1194.571	186.353
153	**Rte 495 SB Ramp from Rte 105**	1,900	0.20	380.0	30	0.02	5.530	0.341	0.292	0.046	3.398	0.739	0.623	0.097	1403.250	561.300	471.868	73.611
154	**Rte 105 SB ramps to NB Ramps**	15,420	0.23	3546.6	40	0.02	5.530	0.317	2.531	0.395	3.398	0.750	5.896	0.920	1403.250	561.300	4402.031	686.717
155	**Rte 495 NB Ramp to Rte 105**	2,030	0.20	406.0	30	0.02	5.530	0.341	0.312	0.049	3.398	0.739	0.666	0.104	1403.250	561.300	504.154	78.648
156	**Rte 495 NB Ramp from Rte 105**	6,150	0.20	1230.0	30	0.02	5.530	0.341	0.946	0.148	3.398	0.739	2.017	0.315	1403.250	561.300	1527.362	238.269
157	**Rte 105 N of Rte 495 NB Ramps**	16,920	0.25	4230.0	40	0.02	5.530	0.317	3.014	0.470	3.398	0.750	7.029	1.097	1403.250	561.300	5249.001	818.844
	Total	1468450.000	67.190	500495.600					360.266	56.202			823.964	128.538			620605.767	96814.500

Notes: Daily to annual factor (6 days/week * 52 weeks per year / 365 days per year) = 85%

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2022 No-Action

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
1	**Bay St**	5,570	0.27	1503.9	35	0.02	3.580	0.188	0.636	0.099	1.065	0.223	0.743	0.116	1423.450	569.380	1892.663	295.255
2	**Broadway 138 N of Bay St**	12,710	0.33	4194.3	40	0.02	3.580	0.181	1.702	0.265	1.065	0.229	2.126	0.332	1423.450	569.380	5276.078	823.068
3	**Exeter St**	340	0.11	37.4	35	0.02	3.580	0.188	0.016	0.003	1.065	0.223	0.019	0.003	1423.450	569.380	47.244	7.370
4	**Broadway 138 Exeter to Washington**	17,440	0.41	7150.4	40	0.02	3.580	0.181	2.892	0.451	1.065	0.229	3.621	0.565	1423.450	569.380	8990.918	1402.583
5	**Washington E of Broadway**	4,320	0.17	734.4	35	0.02	3.580	0.188	0.314	0.049	1.065	0.223	0.364	0.057	1423.450	569.380	925.639	144.400
6	**Washington Court to Broadway**	10,250	0.31	3177.5	35	0.02	3.580	0.188	1.339	0.209	1.065	0.223	1.569	0.245	1423.450	569.380	3997.570	623.621
7	**Broadway 138 Washington to Court**	11,370	0.29	3297.3	40	0.02	3.580	0.181	1.341	0.209	1.065	0.229	1.672	0.261	1423.450	569.380	4148.928	647.233
8	**Washington Court to Martin**	19,830	0.05	991.5	35	0.02	3.580	0.188	0.454	0.071	1.065	0.223	0.500	0.078	1423.450	569.380	1261.891	196.855
9	**Washington Martin to Tremont**	18,660	0.10	1866.0	40	0.02	3.580	0.181	0.786	0.123	1.065	0.229	0.954	0.149	1423.450	569.380	2358.609	367.943
10	**Washington/Oak S of Tremont**	9,800	0.15	1470.0	35	0.02	3.580	0.188	0.631	0.098	1.065	0.223	0.729	0.114	1423.450	569.380	1853.796	289.192
11	**Tremont W of Washington**	15,590	0.15	2338.5	40	0.02	3.580	0.181	0.967	0.151	1.065	0.229	1.191	0.186	1423.450	569.380	2949.050	460.052
12	**Martin Washington to Cohannet**	8,240	0.19	1565.6	35	0.02	3.580	0.188	0.667	0.104	1.065	0.223	0.775	0.121	1423.450	569.380	1972.441	307.701
13	**Court Washington to PO Square**	7,340	0.20	1468.0	35	0.02	3.580	0.188	0.625	0.097	1.065	0.223	0.727	0.113	1423.450	569.380	1849.142	288.466
14	**PO Square**	2,870	0.07	200.9	35	0.02	3.580	0.188	0.090	0.014	1.065	0.223	0.101	0.016	1423.450	569.380	254.686	39.731
15	**Court PO Square to Broadway**	15,540	0.05	777.0	35	0.02	3.580	0.188	0.356	0.056	1.065	0.223	0.392	0.061	1423.450	569.380	988.895	154.268
16	**Cohannet PO Square to Martin**	6,250	0.08	500.0	35	0.02	3.580	0.188	0.221	0.034	1.065	0.223	0.250	0.039	1423.450	569.380	633.086	98.761
17	**Cohannet Martin to High**	10,210	0.05	510.5	35	0.02	3.580	0.188	0.234	0.036	1.065	0.223	0.258	0.040	1423.450	569.380	649.718	101.356
18	**High W of 44**	10,710	0.11	1178.1	35	0.02	3.580	0.188	0.512	0.080	1.065	0.223	0.586	0.091	1423.450	569.380	1488.175	232.155
19	**High E of 44**	8,360	0.22	1839.2	35	0.02	3.580	0.188	0.781	0.122	1.065	0.223	0.910	0.142	1423.450	569.380	2315.989	361.294
20	**Winthrop 44 High to Highland**	12,580	1.19	14970.2	40	0.02	3.580	0.181	6.001	0.936	1.065	0.229	7.566	1.180	1423.450	569.380	18802.678	2933.218
21	**Highland W of 44**	4,880	0.25	1220.0	35	0.02	3.580	0.188	0.516	0.081	1.065	0.223	0.603	0.094	1423.450	569.380	1535.689	239.567
22	**Highland E of 44**	4,670	0.25	1167.5	35	0.02	3.580	0.188	0.494	0.077	1.065	0.223	0.577	0.090	1423.450	569.380	1469.604	229.258
23	**Winthrop 44 S of Highland**	15,690	0.25	3922.5	40	0.02	3.580	0.181	1.600	0.250	1.065	0.229	1.991	0.311	1423.450	569.380	4937.492	770.249
24	**Winthrop 44 High to Main**	8,890	0.19	1689.1	40	0.02	3.580	0.181	0.694	0.108	1.065	0.229	0.859	0.134	1423.450	569.380	2128.034	331.973
25	**Weir 138 S of 44**	8,660	0.25	2165.0	35	0.02	3.580	0.188	0.916	0.143	1.065	0.223	1.070	0.167	1423.450	569.380	2725.219	425.134
26	**Broadway 138 Court to 44**	15,990	0.06	959.4	35	0.02	3.580	0.188	0.433	0.068	1.065	0.223	0.482	0.075	1423.450	569.380	1218.249	190.047
27	**Cohannet PO Square to Broadway**	14,200	0.09	1278.0	30	0.02	3.580	0.200	0.595	0.093	1.065	0.226	0.646	0.101	1423.450	569.380	1616.619	252.193
28	**Main St Broadway to Summer**	19,850	0.19	3771.5	35	0.02	3.580	0.188	1.607	0.251	1.065	0.223	1.867	0.291	1423.450	569.380	4751.572	741.245
29	**Union St**	540	0.13	70.2	35	0.02	3.580	0.188	0.030	0.005	1.065	0.223	0.035	0.005	1423.450	569.380	88.591	13.820
30	**Summer St 140 Main to Ingell**	8,730	0.52	4539.6	40	0.02	3.580	0.181	1.831	0.286	1.065	0.229	2.298	0.358	1423.450	569.380	5706.055	890.145
31	**Ingell S of Summer 140**	8,170	0.25	2042.5	35	0.02	3.580	0.188	0.864	0.135	1.065	0.223	1.009	0.157	1423.450	569.380	2571.020	401.079
32	**County 140 Ingell to Williams**	15,580	0.33	5141.4	40	0.02	3.580	0.181	2.086	0.325	1.065	0.229	2.606	0.407	1423.450	569.380	6467.450	1008.922
33	**44 Union to Longmeadow-Owen**	17,110	0.72	12319.2	40	0.02	3.580	0.181	4.953	0.773	1.065	0.229	6.231	0.972	1423.450	569.380	15478.894	2414.707
34	**Longmeadow**	11,000	0.50	5500.0	35	0.02	3.580	0.188	2.304	0.359	1.065	0.223	2.711	0.423	1423.450	569.380	6913.599	1078.521
35	**Dean 44 E of Longmeadow-Owen**	28,950	0.15	4342.5	40	0.02	3.580	0.181	1.796	0.280	1.065	0.229	2.211	0.345	1423.450	569.380	5476.266	854.298
36	**Owen Dean to Williams**	13,970	0.55	7683.5	35	0.02	3.580	0.188	3.215	0.502	1.065	0.223	3.787	0.591	1423.450	569.380	9657.080	1506.505
37	**Williams N of Owen**	7,390	0.17	1256.3	35	0.02	3.580	0.188	0.537	0.084	1.065	0.223	0.622	0.097	1423.450	569.380	1583.443	247.017
38	**Williams Owen to 140**	3,760	0.14	526.4	35	0.02	3.580	0.188	0.226	0.035	1.065	0.223	0.261	0.041	1423.450	569.380	664.054	103.592
39	**Riverway Ext**	8,760	0.18	1576.8	35	0.02	3.580	0.188	0.673	0.105	1.065	0.223	0.781	0.122	1423.450	569.380	1986.953	309.965
40	**County 140 Williams to Riverway**	11,820	0.12	1418.4	40	0.02	3.580	0.181	0.592	0.092	1.065	0.229	0.724	0.113	1423.450	569.380	1790.785	279.362
41	**County 140 Riverway to Johnson**	19,270	0.52	10020.4	40	0.02	3.580	0.181	4.041	0.630	1.065	0.229	5.071	0.791	1423.450	569.380	12595.151	1964.844
42	**Johnson N of 140**	160	0.47	75.2	35	0.02	3.580	0.188	0.032	0.005	1.065	0.223	0.037	0.006	1423.450	569.380	94.536	14.748
43	**Johnson S of 140**	660	0.26	171.6	35	0.02	3.580	0.188	0.073	0.011	1.065	0.223	0.085	0.013	1423.450	569.380	215.980	33.693
44	**Trucchis Driveway**	1,610	0.04	64.4	20	0.02	3.580	0.240	0.038	0.006	1.065	0.247	0.036	0.006	1423.450	569.380	82.243	12.830
45	**County 140 Johnson to Hart**	18,890	0.27	5100.3	40	0.02	3.580	0.181	2.077	0.324	1.065	0.229	2.587	0.404	1423.450	569.380	6418.744	1001.324
46	**Hart W of 140**	9,750	0.15	1462.5	35	0.02	3.580	0.188	0.628	0.098	1.065	0.223	0.725	0.113	1423.450	569.380	1844.338	287.717
47	**Hart 140 to Poole**	8,470	0.73	6183.1	35	0.02	3.580	0.188	2.581	0.403	1.065	0.223	3.045	0.475	1423.450	569.380	7768.872	1211.944
48	**County 140 Hart to Erika**	23,400	0.41	9594.0	40	0.02	3.580	0.181	3.880	0.605	1.065	0.229	4.859	0.758	1423.450	569.380	12063.503	1881.906
49	**Erika Drive**	14,770	0.14	2067.8	35	0.02	3.580	0.188	0.889	0.139	1.065	0.223	1.026	0.160	1423.450	569.380	2608.532	406.931
50	**BPRTHS Driveway S End**	3,400	0.35	1190.0	20	0.02	3.580	0.240	0.637	0.099	1.065	0.247	0.650	0.101	1423.450	569.380	1496.741	233.492
51	**BPRTHS Driveway N End**	3,790	0.30	1137.0	20	0.02	3.580	0.240	0.610	0.095	1.065	0.247	0.622	0.097	1423.450	569.380	1430.551	223.166
52	**Hess Station opposite BPRTHS Driveway**	2,410	0.02	48.2	20	0.02	3.580	0.240	0.031	0.005	1.065	0.247	0.028	0.004	1423.450	569.380	62.605	9.766
53	**County 140 Erika to BPRTHS Driveway**	22,950	0.12	2754.0	40	0.02	3.580	0.181	1.149	0.179	1.065	0.229	1.405	0.219	1423.450	569.380	3477.032	542.417
54	**County 140 BPRTHS Driveway to Mozzone**	23,060	0.21	4842.6	40	0.02	3.580	0.181	1.983	0.309	1.065	0.229	2.460	0.384	1423.450	569.380	6098.895	951.428
55	**Mozzone Blvd**	5,740	0.21	1205.4	35	0.02	3.580	0.188	0.512	0.080	1.065	0.223	0.596	0.093	1423.450	569.380	1518.112	236.825
56	**County 140 Mozzone to 24 SB Ramp**	25,250	0.24	6060.0	40	0.02	3.580	0.181	2.474	0.386	1.065	0.229	3.076	0.480	1423.450	569.380	7628.975	1190.120
57	**County 140 SB ramp to NB Ramp**	35,070	0.17	5961.9	40	0.02	3.580	0.181	2.456	0.383	1.065	0.229	3.033	0.473	1423.450	569.380	7514.393	1172.245
58	**County 140 NB Ramp to Stevens St**	41,720	0.42	17522.4	40	0.02	3.580	0.181	7.084	1.105	1.065	0.229	8.874	1.384	1423.450	569.380	22031.792	3436.959
59	**24 SB off/on ramp**	21,770	0.21	4571.7	30	0.02	3.580	0.200	2.064	0.322	1.065	0.226	2.292	0.358	1423.450	569.380	5757.716	898.204
60	**24 NB off/on ramp**	19,000	0.22	4180.0	30	0.02	3.580	0.200	1.885	0.294	1.065	0.226	2.095	0.327	1423.450	569.380	5263.610	821.123
61	**Poole St**	5,080	0.17	863.6	35	0.02	3.580	0.188	0.369	0.058	1.065	0.223	0.428	0.067	1423.450	569.380	1088.483	169.803
62	**Middleboro Poole to Stevens**	10,630	0.47	4996.1	35	0.02	3.580	0.188	2.094	0.327	1.065	0.223	2.463	0.384	1423.450	569.380	6280.744	979.796
63	**Stevens Middleboro to Pinehill**	3,250	0.27	877.5	35	0.02	3.580	0.188	0.371	0.058	1.065	0.223	0.434	0.068	1423.450	569.380	1104.337	172.276
64	**Secondary Site Driveway**	0	0.25	0.0	20	0.02	3.580	0.240	0.000	0.000	1.065	0.247	0.000	0.000	1423.450	569.380	0.000	0.000
65	**Stevens Pinehill to O'Connell**	8,820	0.60	5292.0	35	0.02	3.580	0.188	2.213	0.345	1.065	0.223	2.607	0.407	1423.450	569.380	6650.602	1037.494
66	**O'Connell W of Stevens**	3,370	0.46	1550.2	35	0.02	3.580	0.188	0.650	0.101	1.065	0.223	0.764	0.119	1423.450	569.380	1948.864	304.023
67	**Cotley St**	4,410	0.40	1764.0	35	0.02	3.580	0.188	0.741	0.116	1.065	0.223	0.870	0.136	1423.450	569.380	2218.149	346.031
68	**Middleboro Stevens to Pinehill**	7,550	0.32	2416.0	35	0.02	3.580	0.188	1.018	0.159	1.065	0.223	1.193	0.186	1423.450	569.380	3039.325	474.135
69	**Caswell St**	5,230	0.16	836.8	35	0.02	3.580	0.188	0.358	0.056	1.065	0.223	0.415	0.065	1423.450	569.380	1054.973	164.576
70	**Pinehill Stevens to Middleboro**	4,710	0.27	1271.7	35	0.02	3.580	0.188	0.537	0.084	1.065	0.223	0.628	0.098	1423.450	569.380	1600.438	249.668
71	**Middleboro Caswell to Liberty**	9,270	0.60	5562.0	35	0.02	3.580	0.188	2.326	0.363	1.065	0.223	2.741	0.428	1423.450	569.380	6989.918	1090.427
72	**Middleboro E of Liberty**	5,260	0.19	999.4	35	0.02	3.580	0.188	0.426	0.066	1.065	0.223	0.495	0.077	1423.450	569.380	1259.107	196.421

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2022 No-Action

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
73	**Liberty S of Middleboro**	3,700	0.68	2516.0	35	0.02	3.580	0.188	1.051	0.164	1.065	0.223	1.239	0.193	1423.450	569.380	3161.496	493.193
74	**Old Colony Ave N of Middleboro**	9,220	0.19	1751.8	35	0.02	3.580	0.188	0.746	0.116	1.065	0.223	0.867	0.135	1423.450	569.380	2207.027	344.296
75	**Stevens S of O'Connell**	12,530	0.13	1628.9	35	0.02	3.580	0.188	0.703	0.110	1.065	0.223	0.809	0.126	1423.450	569.380	2055.639	320.680
76	**New Ramp**	0	0.10	0.0	30	0.02	3.580	0.200	0.000	0.000	1.065	0.226	0.000	0.000	1423.450	569.380	0.000	0.000
77	**Stevens Street Connector**	14,500	0.24	3480.0	30	0.02	3.580	0.200	1.566	0.244	1.065	0.226	1.743	0.272	1423.450	569.380	4380.995	683.435
78	**Galleria Mall Drive N**	6,170	0.20	1234.0	35	0.02	3.580	0.188	0.525	0.082	1.065	0.223	0.611	0.095	1423.450	569.380	1554.387	242.484
79	**Galleria Mall Drive S**	6,940	0.23	1596.2	35	0.02	3.580	0.188	0.677	0.106	1.065	0.223	0.789	0.123	1423.450	569.380	2009.719	313.516
80	**Galleria Mall Drive**	11,880	0.07	831.6	35	0.02	3.580	0.188	0.371	0.058	1.065	0.223	0.417	0.065	1423.450	569.380	1054.242	164.462
81	**140 NB Ramp to Stevens St Ext**	2,290	0.23	526.7	30	0.02	3.580	0.200	0.237	0.037	1.065	0.226	0.264	0.041	1423.450	569.380	663.149	103.451
82	**Steven St Ext Ramp to 140 NB**	8,410	0.21	1766.1	30	0.02	3.580	0.200	0.797	0.124	1.065	0.226	0.885	0.138	1423.450	569.380	2224.272	346.986
83	**140 SB Ramp to Stevens St Connector**	4,120	0.15	618.0	30	0.02	3.580	0.200	0.282	0.044	1.065	0.226	0.311	0.048	1423.450	569.380	779.351	121.579
84	**Galleria Mall Dr Ramp to 140 SB**	3,360	0.17	571.2	30	0.02	3.580	0.200	0.259	0.040	1.065	0.226	0.287	0.045	1423.450	569.380	719.942	112.311
85	**Stevens St Mall Connector Overpass WB**	1,860	0.20	372.0	30	0.02	3.580	0.200	0.168	0.026	1.065	0.226	0.187	0.029	1423.450	569.380	468.584	73.099
86	**Stevens St Mall Connector Overpass EB**	1,940	0.20	388.0	30	0.02	3.580	0.200	0.175	0.027	1.065	0.226	0.195	0.030	1423.450	569.380	488.738	76.243
87	**Myricks St 79 S of 140**	7,990	0.30	2397.0	40	0.02	3.580	0.181	0.974	0.152	1.065	0.229	1.215	0.190	1423.450	569.380	3015.858	470.474
88	**Myricks St 79 N of 140**	10,540	0.30	3162.0	40	0.02	3.580	0.181	1.285	0.200	1.065	0.229	1.603	0.250	1423.450	569.380	3978.366	620.625
89	**Myricks St 79 under 140**	9,390	0.12	1126.8	40	0.02	3.580	0.181	0.470	0.073	1.065	0.229	0.575	0.090	1423.450	569.380	1422.629	221.930
90	**140 SB Ramp to Myricks St 79**	3,330	0.21	699.3	30	0.02	3.580	0.200	0.316	0.049	1.065	0.226	0.351	0.055	1423.450	569.380	880.716	137.392
91	**Myricks St 79 Ramp to 140 SB**	1,630	0.24	391.2	30	0.02	3.580	0.200	0.176	0.027	1.065	0.226	0.196	0.031	1423.450	569.380	492.484	76.828
92	**140 NB Ramp to Myricks St 79**	1,550	0.17	263.5	30	0.02	3.580	0.200	0.120	0.019	1.065	0.226	0.132	0.021	1423.450	569.380	332.116	51.810
93	**Myricks St 79 Ramp to 140 NB**	3,530	0.19	670.7	30	0.02	3.580	0.200	0.303	0.047	1.065	0.226	0.336	0.052	1423.450	569.380	844.990	131.818
94	**Rte 44 West of Orchard**	36,830	0.25	9207.5	40	0.02	3.580	0.181	3.755	0.586	1.065	0.229	4.673	0.729	1423.450	569.380	11590.046	1808.047
95	**Orchard N of 44**	8,180	0.25	2045.0	35	0.02	3.580	0.188	0.866	0.135	1.065	0.223	1.011	0.158	1423.450	569.380	2574.167	401.570
96	**Orchard S of 44**	10,210	0.25	2552.5	35	0.02	3.580	0.188	1.080	0.169	1.065	0.223	1.262	0.197	1423.450	569.380	3212.989	501.226
97	**Rte 44 Orchard to Hill**	29,920	1.25	37400.0	40	0.02	3.580	0.181	14.990	2.338	1.065	0.229	18.901	2.949	1423.450	569.380	46973.351	7327.843
98	**Hill N of 44**	1,300	0.25	325.0	35	0.02	3.580	0.188	0.138	0.021	1.065	0.223	0.161	0.025	1423.450	569.380	409.097	63.819
99	**Hill S of 44**	1,480	0.25	370.0	35	0.02	3.580	0.188	0.157	0.024	1.065	0.223	0.183	0.029	1423.450	569.380	465.742	72.656
100	**Rte 44 Hill to Church**	21,800	0.46	10028.0	40	0.02	3.580	0.181	4.049	0.632	1.065	0.229	5.077	0.792	1423.450	569.380	12606.897	1966.676
101	**Church N of 44**	2,640	0.25	660.0	35	0.02	3.580	0.188	0.279	0.044	1.065	0.223	0.326	0.051	1423.450	569.380	830.783	129.602
102	**Church S of 44**	3,340	0.25	835.0	35	0.02	3.580	0.188	0.353	0.055	1.065	0.223	0.413	0.064	1423.450	569.380	1051.066	163.966
103	**Rte 44 Church to Richmond**	21,470	0.88	18893.6	40	0.02	3.580	0.181	7.586	1.183	1.065	0.229	9.553	1.490	1423.450	569.380	23735.372	3702.718
104	**Richmond N of 44**	2,480	0.25	620.0	35	0.02	3.580	0.188	0.262	0.041	1.065	0.223	0.306	0.048	1423.450	569.380	780.432	121.747
105	**Richmond S of 44**	940	0.25	235.0	35	0.02	3.580	0.188	0.099	0.016	1.065	0.223	0.116	0.018	1423.450	569.380	295.809	46.146
106	**Rte 44 Richmond to 495 SB ramps**	18,880	1.18	22278.4	40	0.02	3.580	0.181	8.931	1.393	1.065	0.229	11.260	1.757	1423.450	569.380	27981.967	4365.187
107	**495 SB Ramps (off) to Rte 44**	6,660	0.25	1665.0	30	0.02	3.580	0.200	0.749	0.117	1.065	0.226	0.834	0.130	1423.450	569.380	2095.838	326.951
108	**495 SB Ramps (on) from Rte 44**	3,790	0.25	947.5	30	0.02	3.580	0.200	0.426	0.066	1.065	0.226	0.475	0.074	1423.450	569.380	1192.676	186.058
109	**Rte 44 SB Ramps to NB Ramps**	21,510	0.17	3656.7	40	0.02	3.580	0.181	1.506	0.235	1.065	0.229	1.860	0.290	1423.450	569.380	4608.913	718.990
110	**495 NB Ramps (off) to Rte 44**	3,090	0.25	772.5	30	0.02	3.580	0.200	0.347	0.054	1.065	0.226	0.387	0.060	1423.450	569.380	972.393	151.693
111	**495 NB Ramps (on) from Rte 44**	6,930	0.25	1732.5	30	0.02	3.580	0.200	0.779	0.122	1.065	0.226	0.868	0.135	1423.450	569.380	2180.804	340.205
112	**Rte 44 NB Ramps to Rotary**	24,110	0.17	4098.7	40	0.02	3.580	0.181	1.688	0.263	1.065	0.229	2.085	0.325	1423.450	569.380	5166.011	805.898
113	**Bedford 28/18 N of Rotary**	14,810	0.25	3702.5	40	0.02	3.580	0.181	1.510	0.236	1.065	0.229	1.879	0.293	1423.450	569.380	4660.564	727.048
114	**Rte 44 E of Rotary**	19,300	0.25	4825.0	40	0.02	3.580	0.181	1.968	0.307	1.065	0.229	2.449	0.382	1423.450	569.380	6073.524	947.470
115	**W. Grove 28 SE of Rotary**	15,080	0.25	3770.0	40	0.02	3.580	0.181	1.537	0.240	1.065	0.229	1.913	0.298	1423.450	569.380	4745.531	740.303
116	**Bedford 18 S of Rotary to 495 NB Ramps**	11,560	0.17	1965.2	40	0.02	3.580	0.181	0.810	0.126	1.065	0.229	1.000	0.156	1423.450	569.380	2476.943	386.403
117	**Bedford 18 S of Rotary NB to SB ramps**	13,190	0.19	2506.1	40	0.02	3.580	0.181	1.029	0.161	1.065	0.229	1.274	0.199	1423.450	569.380	3157.342	492.545
118	**495 NB Ramps (off) to Rte 18**	2,950	0.28	826.0	30	0.02	3.580	0.200	0.371	0.058	1.065	0.226	0.413	0.065	1423.450	569.380	1039.428	162.151
119	**495 NB Ramps (on) from Rte 18**	2,940	0.28	823.2	30	0.02	3.580	0.200	0.369	0.058	1.065	0.226	0.412	0.064	1423.450	569.380	1035.905	161.601
120	**495 SB Ramps (off) to Rte 18**	7,200	0.28	2016.0	30	0.02	3.580	0.200	0.905	0.141	1.065	0.226	1.009	0.157	1423.450	569.380	2536.910	395.758
121	**495 SB Ramps (on) from Rte 18**	2,010	0.28	562.8	30	0.02	3.580	0.200	0.253	0.039	1.065	0.226	0.282	0.044	1423.450	569.380	708.221	110.482
122	**Bedford 495 SB Ramps to Taunton St**	14,130	0.46	6499.8	40	0.02	3.580	0.181	2.625	0.409	1.065	0.229	3.291	0.513	1423.450	569.380	8171.351	1274.731
123	**Taunton St E of Rte 18**	520	0.25	130.0	35	0.02	3.580	0.188	0.055	0.009	1.065	0.223	0.064	0.010	1423.450	569.380	163.639	25.528
124	**Taunton St W of Rte 18**	2,660	25.00	66500.0	35	0.02	3.580	0.188	27.568	4.301	1.065	0.223	32.695	5.100	1423.450	569.380	83478.079	13022.580
125	**Bedford 18 S of Taunton St.**	10,560	0.25	2640.0	40	0.02	3.580	0.181	1.077	0.168	1.065	0.229	1.340	0.209	1423.450	569.380	3323.130	518.408
126	**Rte 138 N of 495**	23,710	0.25	5927.5	40	0.02	3.580	0.181	2.417	0.377	1.065	0.229	3.008	0.469	1423.450	569.380	7461.309	1163.964
127	**Rte 138 ramp to 495 NB**	5,730	0.27	1547.1	30	0.02	3.580	0.200	0.695	0.108	1.065	0.226	0.775	0.121	1423.450	569.380	1947.030	303.737
128	**495 NB ramp to Rte 138**	3,350	0.27	904.5	30	0.02	3.580	0.200	0.406	0.063	1.065	0.226	0.453	0.071	1423.450	569.380	1138.316	177.577
129	**Rte 138 NB Ramps to SB ramps**	24,450	0.15	3667.5	40	0.02	3.580	0.181	1.517	0.237	1.065	0.229	1.868	0.291	1423.450	569.380	4625.033	721.505
130	**Rte 138 ramp to 495 SB**	3,560	0.27	961.2	30	0.02	3.580	0.200	0.432	0.067	1.065	0.226	0.481	0.075	1423.450	569.380	1209.673	188.709
131	**495 SB ramp to 138**	7,380	0.27	1992.6	30	0.02	3.580	0.200	0.895	0.140	1.065	0.226	0.998	0.156	1423.450	569.380	2507.693	391.200
132	**Rte 138 S of 495**	25,970	0.25	6492.5	40	0.02	3.580	0.181	2.648	0.413	1.065	0.229	3.295	0.514	1423.450	569.380	8172.509	1274.911
133	**Padelford St N of 24 SB Ramps**	8,170	0.25	2042.5	35	0.02	3.580	0.188	0.864	0.135	1.065	0.223	1.009	0.157	1423.450	569.380	2571.020	401.079
134	**Rte 24 SB Ramp to Padelford St**	4,530	0.20	906.0	30	0.02	3.580	0.200	0.409	0.064	1.065	0.226	0.454	0.071	1423.450	569.380	1141.228	178.032
135	**Rte 24 SB Ramp from Padelford St**	860	0.20	172.0	30	0.02	3.580	0.200	0.078	0.012	1.065	0.226	0.086	0.013	1423.450	569.380	216.657	33.798
136	**Padelford St SB Ramps to NB Ramps**	5,480	0.29	1589.2	35	0.02	3.580	0.188	0.671	0.105	1.065	0.223	0.785	0.122	1423.450	569.380	1999.659	311.947
137	**Rte 24 NB Ramp to Padelford St**	780	0.20	156.0	30	0.02	3.580	0.200	0.070	0.011	1.065	0.226	0.078	0.012	1423.450	569.380	196.503	30.654
138	**Rte 24 NB Ramp from Padelford St**	4,700	0.20	940.0	30	0.02	3.580	0.200	0.425	0.066	1.065	0.226	0.471	0.074	1423.450	569.380	1184.055	184.713
139	**Padelford St S of 24 NB Ramps**	4,310	0.25	1077.5	35	0.02	3.580	0.188	0.456	0.071	1.065	0.223	0.533	0.083	1423.450	569.380	1356.315	211.585
140	**Bedford St Rte 18 N of Rte 79**	11,750	0.25	2937.5	40	0.02	3.580	0.181	1.198	0.187	1.065	0.229	1.491	0.233	1423.450	569.380	3697.612	576.827
141	**Bedford St Rte 18 S of Rte 79**	7,810	0.25	1952.5	40	0.02	3.580	0.181	0.796	0.124	1.065	0.229	0.991	0.155	1423.450	569.380	2457.732	383.406
142	**RI Rd Rte 79 W of Rte 18**	8,650	0.25	2162.5	40	0.02	3.580	0.181	0.882	0.138	1.065	0.229	1.097	0.171	1423.450	569.380	2722.072	424.643
143	**RI Rd Rte 79 E of Rte 18**	6,930	0.25	1732.5	40	0.02	3.580	0.181	0.707	0.110	1.065	0.229	0.879	0.137	1423.450	569.380	2180.804	340.205
144	**Rte 104 Pleasant St W of Rte 24 SB Ramps**	11,820	0.25	2955.0	40	0.02	3.580	0.181	1.205	0.188	1.065	0.229	1.500	0.234	1423.450	569.380	3719.640	580.264

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2022 No-Action

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
145	**Rte 24 SB Ramp to Rte 104**	7,470	0.28	2091.6	30	0.02	3.580	0.200	0.939	0.146	1.065	0.226	1.047	0.163	1423.450	569.380	2632.044	410.599
146	**Rte 24 SB Ramp from Rte 104**	8,090	0.28	2265.2	30	0.02	3.580	0.200	1.017	0.159	1.065	0.226	1.134	0.177	1423.450	569.380	2850.500	444.678
147	**Rte 104 SB ramps to NB Ramps**	18,890	0.23	4344.7	40	0.02	3.580	0.181	1.775	0.277	1.065	0.229	2.206	0.344	1423.450	569.380	5470.258	853.360
148	**Rte 24 NB ramp to Rte 104**	7,580	0.28	2122.4	30	0.02	3.580	0.200	0.952	0.149	1.065	0.226	1.062	0.166	1423.450	569.380	2670.802	416.645
149	**Rte 24 NB ramp from Rte 104**	5,580	0.28	1562.4	30	0.02	3.580	0.200	0.701	0.109	1.065	0.226	0.782	0.122	1423.450	569.380	1966.105	306.712
150	**Rte 104 Pleasant St E of Rte 24 NB Ramps**	26,320	0.25	6580.0	40	0.02	3.580	0.181	2.683	0.419	1.065	0.229	3.339	0.521	1423.450	569.380	8282.650	1292.093
151	**Rte 105 S of Rte 495 SB Ramps**	15,470	0.25	3867.5	40	0.02	3.580	0.181	1.577	0.246	1.065	0.229	1.963	0.306	1423.450	569.380	4868.260	759.449
152	**Rte 495 SB Ramp to Rte 105**	5,110	0.20	1022.0	30	0.02	3.580	0.200	0.462	0.072	1.065	0.226	0.513	0.080	1423.450	569.380	1287.345	200.826
153	**Rte 495 SB Ramp from Rte 105**	2,100	0.20	420.0	30	0.02	3.580	0.200	0.190	0.030	1.065	0.226	0.211	0.033	1423.450	569.380	529.046	82.531
154	**Rte 105 SB ramps to NB Ramps**	16,650	0.23	3829.5	40	0.02	3.580	0.181	1.565	0.244	1.065	0.229	1.944	0.303	1423.450	569.380	4821.588	752.168
155	**Rte 495 NB Ramp to Rte 105**	2,230	0.20	446.0	30	0.02	3.580	0.200	0.202	0.031	1.065	0.226	0.224	0.035	1423.450	569.380	561.796	87.640
156	**Rte 495 NB Ramp from Rte 105**	6,530	0.20	1306.0	30	0.02	3.580	0.200	0.590	0.092	1.065	0.226	0.655	0.102	1423.450	569.380	1645.081	256.633
157	**Rte 105 N of Rte 495 NB Ramps**	20,220	0.25	5055.0	40	0.02	3.580	0.181	2.061	0.322	1.065	0.229	2.565	0.400	1423.450	569.380	6363.039	992.634
	Total	1584840.000	67.190	539111.200					223.550	34.874			270.741	42.236			678114.123	105785.803

Notes: Daily to annual factor (6 days/week * 52 weeks per year / 365 days per year) = 85%

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2022 Alternative A

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
1	**Bay St**	5,650	0.27	1525.5	35	0.02	3.580	0.188	0.645	0.101	1.065	0.223	0.754	0.118	1423.450	569.380	1919.847	299.496
2	**Broadway 138 N of Bay St**	12,790	0.33	4220.7	40	0.02	3.580	0.181	1.712	0.267	1.065	0.229	2.139	0.334	1423.450	569.380	5309.287	828.249
3	**Exeter St**	340	0.11	37.4	35	0.02	3.580	0.188	0.016	0.003	1.065	0.223	0.019	0.003	1423.450	569.380	47.244	7.370
4	**Broadway 138 Exeter to Washington**	17,600	0.41	7216.0	40	0.02	3.580	0.181	2.918	0.455	1.065	0.229	3.655	0.570	1423.450	569.380	9073.404	1415.451
5	**Washington E of Broadway**	4,320	0.17	734.4	35	0.02	3.580	0.188	0.314	0.049	1.065	0.223	0.364	0.057	1423.450	569.380	925.639	144.400
6	**Washington Court to Broadway**	10,280	0.31	3186.8	35	0.02	3.580	0.188	1.343	0.210	1.065	0.223	1.573	0.245	1423.450	569.380	4009.270	625.446
7	**Broadway 138 Washington to Court**	11,510	0.29	3337.9	40	0.02	3.580	0.181	1.357	0.212	1.065	0.229	1.693	0.264	1423.450	569.380	4200.015	655.202
8	**Washington Court to Martin**	19,830	0.05	991.5	35	0.02	3.580	0.188	0.454	0.071	1.065	0.223	0.500	0.078	1423.450	569.380	1261.891	196.855
9	**Washington Martin to Tremont**	18,850	0.10	1885.0	40	0.02	3.580	0.181	0.794	0.124	1.065	0.229	0.964	0.150	1423.450	569.380	2382.624	371.689
10	**Washington/Oak S of Tremont**	9,800	0.15	1470.0	35	0.02	3.580	0.188	0.631	0.098	1.065	0.223	0.729	0.114	1423.450	569.380	1853.796	289.192
11	**Tremont W of Washington**	15,770	0.15	2365.5	40	0.02	3.580	0.181	0.979	0.153	1.065	0.229	1.205	0.188	1423.450	569.380	2983.099	465.363
12	**Martin Washington to Cohannet**	8,420	0.19	1599.8	35	0.02	3.580	0.188	0.682	0.106	1.065	0.223	0.792	0.124	1423.450	569.380	2015.528	314.422
13	**Court Washington to PO Square**	7,340	0.20	1468.0	35	0.02	3.580	0.188	0.625	0.097	1.065	0.223	0.727	0.113	1423.450	569.380	1849.142	288.466
14	**PO Square**	2,870	0.07	200.9	35	0.02	3.580	0.188	0.090	0.014	1.065	0.223	0.101	0.016	1423.450	569.380	254.686	39.731
15	**Court PO Square to Broadway**	15,700	0.05	785.0	35	0.02	3.580	0.188	0.360	0.056	1.065	0.223	0.396	0.062	1423.450	569.380	999.077	155.856
16	**Cohannet PO Square to Martin**	6,430	0.08	514.4	35	0.02	3.580	0.188	0.227	0.035	1.065	0.223	0.257	0.040	1423.450	569.380	651.318	101.606
17	**Cohannet Martin to High**	10,210	0.05	510.5	35	0.02	3.580	0.188	0.234	0.036	1.065	0.223	0.258	0.040	1423.450	569.380	649.718	101.356
18	**High W of 44**	10,710	0.11	1178.1	35	0.02	3.580	0.188	0.512	0.080	1.065	0.223	0.586	0.091	1423.450	569.380	1488.175	232.155
19	**High E of 44**	8,890	0.22	1955.8	35	0.02	3.580	0.188	0.830	0.129	1.065	0.223	0.967	0.151	1423.450	569.380	2462.816	384.199
20	**Winthrop 44 High to Highland**	13,110	1.19	15600.9	40	0.02	3.580	0.181	6.254	0.976	1.065	0.229	7.885	1.230	1423.450	569.380	19594.842	3056.795
21	**Highland W of 44**	4,880	0.25	1220.0	35	0.02	3.580	0.188	0.516	0.081	1.065	0.223	0.603	0.094	1423.450	569.380	1535.689	239.567
22	**Highland E of 44**	4,670	0.25	1167.5	35	0.02	3.580	0.188	0.494	0.077	1.065	0.223	0.577	0.090	1423.450	569.380	1469.604	229.258
23	**Winthrop 44 S of Highland**	16,220	0.25	4055.0	40	0.02	3.580	0.181	1.654	0.258	1.065	0.229	2.058	0.321	1423.450	569.380	5104.278	796.267
24	**Winthrop 44 High to Main**	8,890	0.19	1689.1	40	0.02	3.580	0.181	0.694	0.108	1.065	0.229	0.859	0.134	1423.450	569.380	2128.034	331.973
25	**Weir 138 S of 44**	8,660	0.25	2165.0	35	0.02	3.580	0.188	0.916	0.143	1.065	0.223	1.070	0.167	1423.450	569.380	2725.219	425.134
26	**Broadway 138 Court to 44**	16,120	0.06	967.2	35	0.02	3.580	0.188	0.436	0.068	1.065	0.223	0.486	0.076	1423.450	569.380	1228.154	191.592
27	**Cohannet PO Square to Broadway**	14,390	0.09	1295.1	30	0.02	3.580	0.200	0.603	0.094	1.065	0.226	0.655	0.102	1423.450	569.380	1638.250	255.567
28	**Main St Broadway to Summer**	20,000	0.19	3800.0	35	0.02	3.580	0.188	1.619	0.253	1.065	0.223	1.881	0.293	1423.450	569.380	4787.478	746.847
29	**Union St**	540	0.13	70.2	35	0.02	3.580	0.188	0.030	0.005	1.065	0.223	0.035	0.005	1423.450	569.380	88.591	13.820
30	**Summer St 140 Main to Ingell**	9,050	0.52	4706.0	40	0.02	3.580	0.181	1.898	0.296	1.065	0.229	2.382	0.372	1423.450	569.380	5915.211	922.773
31	**Ingell S of Summer 140**	8,700	0.25	2175.0	35	0.02	3.580	0.188	0.921	0.144	1.065	0.223	1.075	0.168	1423.450	569.380	2737.806	427.098
32	**County 140 Ingell to Williams**	16,430	0.33	5421.9	40	0.02	3.580	0.181	2.200	0.343	1.065	0.229	2.748	0.429	1423.450	569.380	6820.296	1063.966
33	**44 Union to Longmeadow-Owen**	17,110	0.72	12319.2	40	0.02	3.580	0.181	4.953	0.773	1.065	0.229	6.231	0.972	1423.450	569.380	15478.894	2414.707
34	**Longmeadow**	11,060	0.50	5530.0	35	0.02	3.580	0.188	2.316	0.361	1.065	0.223	2.726	0.425	1423.450	569.380	6951.310	1084.404
35	**Dean 44 E of Longmeadow-Owen**	29,070	0.15	4360.5	40	0.02	3.580	0.181	1.804	0.281	1.065	0.229	2.220	0.346	1423.450	569.380	5498.966	857.839
36	**Owen Dean to Williams**	14,150	0.55	7782.5	35	0.02	3.580	0.188	3.257	0.508	1.065	0.223	3.835	0.598	1423.450	569.380	9781.509	1525.915
37	**Williams N of Owen**	7,390	0.17	1256.3	35	0.02	3.580	0.188	0.537	0.084	1.065	0.223	0.622	0.097	1423.450	569.380	1583.443	247.017
38	**Williams Owen to 140**	3,760	0.14	526.4	35	0.02	3.580	0.188	0.226	0.035	1.065	0.223	0.261	0.041	1423.450	569.380	664.054	103.592
39	**Riverway Ext**	8,710	0.18	1567.8	35	0.02	3.580	0.188	0.669	0.104	1.065	0.223	0.776	0.121	1423.450	569.380	1975.612	308.195
40	**County 140 Williams to Riverway**	12,680	0.12	1521.6	40	0.02	3.580	0.181	0.635	0.099	1.065	0.229	0.776	0.121	1423.450	569.380	1921.079	299.688
41	**County 140 Riverway to Johnson**	20,300	0.52	10556.0	40	0.02	3.580	0.181	4.257	0.664	1.065	0.229	5.343	0.833	1423.450	569.380	13268.374	2069.866
42	**Johnson N of 140**	160	0.47	75.2	35	0.02	3.580	0.188	0.032	0.005	1.065	0.223	0.037	0.006	1423.450	569.380	94.536	14.748
43	**Johnson S of 140**	660	0.26	171.6	35	0.02	3.580	0.188	0.073	0.011	1.065	0.223	0.085	0.013	1423.450	569.380	215.980	33.693
44	**Trucchis Driveway**	1,610	0.04	64.4	20	0.02	3.580	0.240	0.038	0.006	1.065	0.247	0.036	0.006	1423.450	569.380	82.243	12.830
45	**County 140 Johnson to Hart**	19,920	0.27	5378.4	40	0.02	3.580	0.181	2.190	0.342	1.065	0.229	2.728	0.426	1423.450	569.380	6768.733	1055.922
46	**Hart W of 140**	9,830	0.15	1474.5	35	0.02	3.580	0.188	0.633	0.099	1.065	0.223	0.731	0.114	1423.450	569.380	1859.471	290.078
47	**Hart 140 to Poole**	8,710	0.73	6358.3	35	0.02	3.580	0.188	2.654	0.414	1.065	0.223	3.132	0.489	1423.450	569.380	7989.005	1246.285
48	**County 140 Hart to Erika**	24,280	0.41	9954.8	40	0.02	3.580	0.181	4.026	0.628	1.065	0.229	5.042	0.786	1423.450	569.380	12517.173	1952.679
49	**Erika Drive**	14,770	0.14	2067.8	35	0.02	3.580	0.188	0.889	0.139	1.065	0.223	1.026	0.160	1423.450	569.380	2608.532	406.931
50	**BPRTHS Driveway S End**	3,400	0.35	1190.0	20	0.02	3.580	0.240	0.637	0.099	1.065	0.247	0.650	0.101	1423.450	569.380	1496.741	233.492
51	**BPRTHS Driveway N End**	3,790	0.30	1137.0	20	0.02	3.580	0.240	0.610	0.095	1.065	0.247	0.622	0.097	1423.450	569.380	1430.551	223.166
52	**Hess Station opposite BPRTHS Driveway**	2,410	0.02	48.2	20	0.02	3.580	0.240	0.031	0.005	1.065	0.247	0.028	0.004	1423.450	569.380	62.605	9.766
53	**County 140 Erika to BPRTHS Driveway**	23,830	0.12	2859.6	40	0.02	3.580	0.181	1.193	0.186	1.065	0.229	1.459	0.228	1423.450	569.380	3610.356	563.216
54	**County 140 BPRTHS Driveway to Mozzone**	23,940	0.21	5027.4	40	0.02	3.580	0.181	2.059	0.321	1.065	0.229	2.554	0.398	1423.450	569.380	6331.636	987.735
55	**Mozzone Blvd**	5,740	0.21	1205.4	35	0.02	3.580	0.188	0.512	0.080	1.065	0.223	0.596	0.093	1423.450	569.380	1518.112	236.825
56	**County 140 Mozzone to 24 SB Ramp**	26,130	0.24	6271.2	40	0.02	3.580	0.181	2.560	0.399	1.065	0.229	3.183	0.497	1423.450	569.380	7894.856	1231.598
57	**County 140 SB ramp to NB Ramp**	41,850	0.17	7114.5	40	0.02	3.580	0.181	2.931	0.457	1.065	0.229	3.619	0.565	1423.450	569.380	8967.132	1398.873
58	**County 140 NB Ramp to Stevens St**	52,130	0.42	21894.6	40	0.02	3.580	0.181	8.851	1.381	1.065	0.229	11.088	1.730	1423.450	569.380	27529.178	4294.552
59	**24 SB off/on ramp**	27,670	0.21	5810.7	30	0.02	3.580	0.200	2.623	0.409	1.065	0.226	2.913	0.454	1423.450	569.380	7318.144	1141.631
60	**24 NB off/on ramp**	19,890	0.22	4375.8	30	0.02	3.580	0.200	1.973	0.308	1.065	0.226	2.193	0.342	1423.450	569.380	5510.169	859.586
61	**Poole St**	5,200	0.17	884.0	35	0.02	3.580	0.188	0.378	0.059	1.065	0.223	0.438	0.068	1423.450	569.380	1114.196	173.815
62	**Middleboro Poole to Stevens**	10,990	0.47	5165.3	35	0.02	3.580	0.188	2.165	0.338	1.065	0.223	2.547	0.397	1423.450	569.380	6493.450	1012.978
63	**Stevens Middleboro to Pinehill**	3,610	0.27	974.7	35	0.02	3.580	0.188	0.412	0.064	1.065	0.223	0.482	0.075	1423.450	569.380	1226.663	191.359
64	**Secondary Site Driveway**	1,330	0.25	332.5	20	0.02	3.580	0.240	0.179	0.028	1.065	0.247	0.182	0.028	1423.450	569.380	418.538	65.292
65	**Stevens Pinehill to O'Connell**	9,110	0.60	5466.0	35	0.02	3.580	0.188	2.285	0.357	1.065	0.223	2.693	0.420	1423.450	569.380	6869.272	1071.606
66	**O'Connell W of Stevens**	17,290	0.46	7953.4	35	0.02	3.580	0.188	3.334	0.520	1.065	0.223	3.921	0.612	1423.450	569.380	9998.773	1559.809
67	**Cotley St**	4,410	0.40	1764.0	35	0.02	3.580	0.188	0.741	0.116	1.065	0.223	0.870	0.136	1423.450	569.380	2218.149	346.031
68	**Middleboro Stevens to Pinehill**	7,550	0.32	2416.0	35	0.02	3.580	0.188	1.018	0.159	1.065	0.223	1.193	0.186	1423.450	569.380	3039.325	474.135
69	**Caswell St**	5,210	0.16	833.6	35	0.02	3.580	0.188	0.357	0.056	1.065	0.223	0.413	0.064	1423.450	569.380	1050.939	163.946
70	**Pinehill Stevens to Middleboro**	5,080	0.27	1371.6	35	0.02	3.580	0.188	0.580	0.090	1.065	0.223	0.678	0.106	1423.450	569.380	1726.163	269.281
71	**Middleboro Caswell to Liberty**	9,620	0.60	5772.0	35	0.02	3.580	0.188	2.413	0.376	1.065	0.223	2.844	0.444	1423.450	569.380	7253.831	1131.598
72	**Middleboro E of Liberty**	4,880	0.19	927.2	35	0.02	3.580	0.188	0.395	0.062	1.065	0.223	0.459	0.072	1423.450	569.380	1168.145	182.231

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2022 Alternative A

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
73	Liberty S of Middleboro	3,700	0.68	2516.0	35	0.02	3.580	0.188	1.051	0.164	1.065	0.223	1.239	0.193	1423.450	569.380	3161.496	493.193
74	Old Colony Ave N of Middleboro	9,570	0.19	1818.3	35	0.02	3.580	0.188	0.775	0.121	1.065	0.223	0.900	0.140	1423.450	569.380	2290.808	357.366
75	Stevens S of O'Connell	26,450	0.13	3438.5	35	0.02	3.580	0.188	1.483	0.231	1.065	0.223	1.708	0.266	1423.450	569.380	4339.319	676.934
76	New Ramp	0	0.10	0.0	30	0.02	3.580	0.200	0.000	0.000	1.065	0.226	0.000	0.000	1423.450	569.380	0.000	0.000
77	Stevens Street Connector	22,200	0.24	5328.0	30	0.02	3.580	0.200	2.398	0.374	1.065	0.226	2.669	0.416	1423.450	569.380	6707.455	1046.363
78	Galleria Mall Drive N	6,170	0.20	1234.0	35	0.02	3.580	0.188	0.525	0.082	1.065	0.223	0.611	0.095	1423.450	569.380	1554.387	242.484
79	Galleria Mall Drive S	6,940	0.23	1596.2	35	0.02	3.580	0.188	0.677	0.106	1.065	0.223	0.789	0.123	1423.450	569.380	2009.719	313.516
80	Galleria Mall Drive	11,880	0.07	831.6	35	0.02	3.580	0.188	0.371	0.058	1.065	0.223	0.417	0.065	1423.450	569.380	1054.242	164.462
81	140 NB Ramp to Stevens St Ext	2,950	0.23	678.5	30	0.02	3.580	0.200	0.306	0.048	1.065	0.226	0.340	0.053	1423.450	569.380	854.275	133.267
82	Steven St Ext Ramp to 140 NB	13,330	0.21	2799.3	30	0.02	3.580	0.200	1.264	0.197	1.065	0.226	1.403	0.219	1423.450	569.380	3525.510	549.980
83	140 SB Ramp to Stevens St Connector	8,450	0.15	1267.5	30	0.02	3.580	0.200	0.577	0.090	1.065	0.226	0.637	0.099	1423.450	569.380	1598.427	249.355
84	Galleria Mall Dr Ramp to 140 SB	4,280	0.17	727.6	30	0.02	3.580	0.200	0.330	0.052	1.065	0.226	0.365	0.057	1423.450	569.380	917.069	143.063
85	Stevens St Mall Connector Overpass WB	1,860	0.20	372.0	30	0.02	3.580	0.200	0.168	0.026	1.065	0.226	0.187	0.029	1423.450	569.380	468.584	73.099
86	Stevens St Mall Connector Overpass EB	1,940	0.20	388.0	30	0.02	3.580	0.200	0.175	0.027	1.065	0.226	0.195	0.030	1423.450	569.380	488.738	76.243
87	Myricks St 79 S of 140	7,990	0.30	2397.0	40	0.02	3.580	0.181	0.974	0.152	1.065	0.229	1.215	0.190	1423.450	569.380	3015.858	470.474
88	Myricks St 79 N of 140	11,590	0.30	3477.0	40	0.02	3.580	0.181	1.413	0.220	1.065	0.229	1.763	0.275	1423.450	569.380	4374.693	682.452
89	Myricks St 79 under 140	9,820	0.12	1178.4	40	0.02	3.580	0.181	0.492	0.077	1.065	0.229	0.601	0.094	1423.450	569.380	1487.776	232.093
90	140 SB Ramp to Myricks St 79	3,760	0.21	789.6	30	0.02	3.580	0.200	0.356	0.056	1.065	0.226	0.396	0.062	1423.450	569.380	994.442	155.133
91	Myricks St 79 Ramp to 140 SB	1,630	0.24	391.2	30	0.02	3.580	0.200	0.176	0.027	1.065	0.226	0.196	0.031	1423.450	569.380	492.484	76.828
92	140 NB Ramp to Myricks St 79	1,550	0.17	263.5	30	0.02	3.580	0.200	0.120	0.019	1.065	0.226	0.132	0.021	1423.450	569.380	332.116	51.810
93	Myricks St 79 Ramp to 140 NB	3,840	0.19	729.6	30	0.02	3.580	0.200	0.330	0.051	1.065	0.226	0.366	0.057	1423.450	569.380	919.196	143.395
94	Rte 44 West of Orchard	37,540	0.25	9385.0	40	0.02	3.580	0.181	3.827	0.597	1.065	0.229	4.763	0.743	1423.450	569.380	11813.476	1842.902
95	Orchard N of 44	8,180	0.25	2045.0	35	0.02	3.580	0.188	0.866	0.135	1.065	0.223	1.011	0.158	1423.450	569.380	2574.167	401.570
96	Orchard S of 44	10,560	0.25	2640.0	35	0.02	3.580	0.188	1.117	0.174	1.065	0.223	1.305	0.204	1423.450	569.380	3323.130	518.408
97	Rte 44 Orchard to Hill	30,980	1.25	38725.0	40	0.02	3.580	0.181	15.521	2.421	1.065	0.229	19.571	3.053	1423.450	569.380	48637.514	7587.452
98	Hill N of 44	1,300	0.25	325.0	35	0.02	3.580	0.188	0.138	0.021	1.065	0.223	0.161	0.025	1423.450	569.380	409.097	63.819
99	Hill S of 44	1,480	0.25	370.0	35	0.02	3.580	0.188	0.157	0.024	1.065	0.223	0.183	0.029	1423.450	569.380	465.742	72.656
100	Rte 44 Hill to Church	22,820	0.46	10497.2	40	0.02	3.580	0.181	4.239	0.661	1.065	0.229	5.315	0.829	1423.450	569.380	13196.761	2058.695
101	Church N of 44	2,620	0.25	655.0	35	0.02	3.580	0.188	0.277	0.043	1.065	0.223	0.324	0.051	1423.450	569.380	824.489	128.620
102	Church S of 44	3,340	0.25	835.0	35	0.02	3.580	0.188	0.353	0.055	1.065	0.223	0.413	0.064	1423.450	569.380	1051.066	163.966
103	Rte 44 Church to Richmond	22,520	0.88	19817.6	40	0.02	3.580	0.181	7.957	1.241	1.065	0.229	10.020	1.563	1423.450	569.380	24896.161	3883.801
104	Richmond N of 44	2,470	0.25	617.5	35	0.02	3.580	0.188	0.261	0.041	1.065	0.223	0.305	0.048	1423.450	569.380	777.285	121.256
105	Richmond S of 44	940	0.25	235.0	35	0.02	3.580	0.188	0.099	0.016	1.065	0.223	0.116	0.018	1423.450	569.380	295.809	46.146
106	Rte 44 Richmond to 495 SB ramps	19,930	1.18	23517.4	40	0.02	3.580	0.181	9.428	1.471	1.065	0.229	11.886	1.854	1423.450	569.380	29538.168	4607.954
107	495 SB Ramps (off) to Rte 44	6,660	0.25	1665.0	30	0.02	3.580	0.200	0.749	0.117	1.065	0.226	0.834	0.130	1423.450	569.380	2095.838	326.951
108	495 SB Ramps (on) from Rte 44	3,790	0.25	947.5	30	0.02	3.580	0.200	0.426	0.066	1.065	0.226	0.475	0.074	1423.450	569.380	1192.676	186.058
109	Rte 44 SB Ramps to NB Ramps	22,040	0.17	3746.8	40	0.02	3.580	0.181	1.543	0.241	1.065	0.229	1.906	0.297	1423.450	569.380	4722.475	736.706
110	495 NB Ramps (off) to Rte 44	3,090	0.25	772.5	30	0.02	3.580	0.200	0.347	0.054	1.065	0.226	0.387	0.060	1423.450	569.380	972.393	151.693
111	495 NB Ramps (on) from Rte 44	6,930	0.25	1732.5	30	0.02	3.580	0.200	0.779	0.122	1.065	0.226	0.868	0.135	1423.450	569.380	2180.804	340.205
112	Rte 44 NB Ramps to Rotary	25,160	0.17	4277.2	40	0.02	3.580	0.181	1.762	0.275	1.065	0.229	2.176	0.339	1423.450	569.380	5390.993	840.995
113	Bedford 28/18 N of Rotary	14,810	0.25	3702.5	40	0.02	3.580	0.181	1.510	0.236	1.065	0.229	1.879	0.293	1423.450	569.380	4660.564	727.048
114	Rte 44 E of Rotary	20,350	0.25	5087.5	40	0.02	3.580	0.181	2.075	0.324	1.065	0.229	2.582	0.403	1423.450	569.380	6403.949	999.016
115	W. Grove 28 SE of Rotary	15,080	0.25	3770.0	40	0.02	3.580	0.181	1.537	0.240	1.065	0.229	1.913	0.298	1423.450	569.380	4745.531	740.303
116	Bedford 18 S of Rotary to 495 NB Ramps	11,560	0.17	1965.2	40	0.02	3.580	0.181	0.810	0.126	1.065	0.229	1.000	0.156	1423.450	569.380	2476.943	386.403
117	Bedford 18 S of Rotary NB to SB ramps	13,190	0.19	2506.1	40	0.02	3.580	0.181	1.029	0.161	1.065	0.229	1.274	0.199	1423.450	569.380	3157.342	492.545
118	495 NB Ramps (off) to Rte 18	2,950	0.28	826.0	30	0.02	3.580	0.200	0.371	0.058	1.065	0.226	0.413	0.065	1423.450	569.380	1039.428	162.151
119	495 NB Ramps (on) from Rte 18	2,940	0.28	823.2	30	0.02	3.580	0.200	0.369	0.058	1.065	0.226	0.412	0.064	1423.450	569.380	1035.905	161.601
120	495 SB Ramps (off) to Rte 18	7,200	0.28	2016.0	30	0.02	3.580	0.200	0.905	0.141	1.065	0.226	1.009	0.157	1423.450	569.380	2536.910	395.758
121	495 SB Ramps (on) from Rte 18	2,010	0.28	562.8	30	0.02	3.580	0.200	0.253	0.039	1.065	0.226	0.282	0.044	1423.450	569.380	708.221	110.482
122	Bedford 495 SB Ramps to Taunton St	14,130	0.46	6499.8	40	0.02	3.580	0.181	2.625	0.409	1.065	0.229	3.291	0.513	1423.450	569.380	8171.351	1274.731
123	Taunton St E of Rte 18	520	0.25	130.0	35	0.02	3.580	0.188	0.055	0.009	1.065	0.223	0.064	0.010	1423.450	569.380	163.639	25.528
124	Taunton St W of Rte 18	2,660	25.00	66500.0	35	0.02	3.580	0.188	27.568	4.301	1.065	0.223	32.695	5.100	1423.450	569.380	83478.079	13022.580
125	Bedford 18 S of Taunton St.	10,560	0.25	2640.0	40	0.02	3.580	0.181	1.077	0.168	1.065	0.229	1.340	0.209	1423.450	569.380	3323.130	518.408
126	Rte 138 N of 495	23,710	0.25	5927.5	40	0.02	3.580	0.181	2.417	0.377	1.065	0.229	3.008	0.469	1423.450	569.380	7461.309	1163.964
127	Rte 138 ramp to 495 NB	5,730	0.27	1547.1	30	0.02	3.580	0.200	0.695	0.108	1.065	0.226	0.775	0.121	1423.450	569.380	1947.030	303.737
128	495 NB ramp to Rte 138	3,350	0.27	904.5	30	0.02	3.580	0.200	0.406	0.063	1.065	0.226	0.453	0.071	1423.450	569.380	1138.316	177.577
129	Rte 138 NB Ramps to SB ramps	24,450	0.15	3667.5	40	0.02	3.580	0.181	1.517	0.237	1.065	0.229	1.868	0.291	1423.450	569.380	4625.033	721.505
130	Rte 138 ramp to 495 SB	3,560	0.27	961.2	30	0.02	3.580	0.200	0.432	0.067	1.065	0.226	0.481	0.075	1423.450	569.380	1209.673	188.709
131	495 SB ramp to 138	7,380	0.27	1992.6	30	0.02	3.580	0.200	0.895	0.140	1.065	0.226	0.998	0.156	1423.450	569.380	2507.693	391.200
132	Rte 138 S of 495	25,970	0.25	6492.5	40	0.02	3.580	0.181	2.648	0.413	1.065	0.229	3.295	0.514	1423.450	569.380	8172.509	1274.911
133	Padelford St N of 24 SB Ramps	8,310	0.25	2077.5	35	0.02	3.580	0.188	0.879	0.137	1.065	0.223	1.027	0.160	1423.450	569.380	2615.077	407.952
134	Rte 24 SB Ramp to Padelford St	4,590	0.20	918.0	30	0.02	3.580	0.200	0.415	0.065	1.065	0.226	0.460	0.072	1423.450	569.380	1156.343	180.390
135	Rte 24 SB Ramp from Padelford St	860	0.20	172.0	30	0.02	3.580	0.200	0.078	0.012	1.065	0.226	0.086	0.013	1423.450	569.380	216.657	33.798
136	Padelford St SB Ramps to NB Ramps	5,550	0.29	1609.5	35	0.02	3.580	0.188	0.679	0.106	1.065	0.223	0.795	0.124	1423.450	569.380	2025.202	315.932
137	Rte 24 NB Ramp to Padelford St	780	0.20	156.0	30	0.02	3.580	0.200	0.070	0.011	1.065	0.226	0.078	0.012	1423.450	569.380	196.503	30.654
138	Rte 24 NB Ramp from Padelford St	4,700	0.20	940.0	30	0.02	3.580	0.200	0.425	0.066	1.065	0.226	0.471	0.074	1423.450	569.380	1184.055	184.713
139	Padelford St S of 24 NB Ramps	4,030	0.25	1007.5	35	0.02	3.580	0.188	0.426	0.067	1.065	0.223	0.498	0.078	1423.450	569.380	1268.202	197.840
140	Bedford St Rte 18 N of Rte 79	11,250	0.25	2812.5	40	0.02	3.580	0.181	1.147	0.179	1.065	0.229	1.427	0.223	1423.450	569.380	3540.267	552.282
141	Bedford St Rte 18 S of Rte 79	7,810	0.25	1952.5	40	0.02	3.580	0.181	0.796	0.124	1.065	0.229	0.991	0.155	1423.450	569.380	2457.732	383.406
142	RI Rd Rte 79 W of Rte 18	9,700	0.25	2425.0	40	0.02	3.580	0.181	0.989	0.154	1.065	0.229	1.231	0.192	1423.450	569.380	3052.497	476.189
143	RI Rd Rte 79 E of Rte 18	7,480	0.25	1870.0	40	0.02	3.580	0.181	0.763	0.119	1.065	0.229	0.949	0.148	1423.450	569.380	2353.884	367.206
144	Rte 104 Pleasant St W of Rte 24 SB Ramps	11,820	0.25	2955.0	40	0.02	3.580	0.181	1.205	0.188	1.065	0.229	1.500	0.234	1423.450	569.380	3719.640	580.264

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2022 Alternative A

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
145	**Rte 24 SB Ramp to Rte 104**	7,470	0.28	2091.6	30	0.02	3.580	0.200	0.939	0.146	1.065	0.226	1.047	0.163	1423.450	569.380	2632.044	410.599
146	**Rte 24 SB Ramp from Rte 104**	8,040	0.28	2251.2	30	0.02	3.580	0.200	1.010	0.158	1.065	0.226	1.127	0.176	1423.450	569.380	2832.883	441.930
147	**Rte 104 SB ramps to NB Ramps**	19,040	0.23	4379.2	40	0.02	3.580	0.181	1.789	0.279	1.065	0.229	2.223	0.347	1423.450	569.380	5513.696	860.137
148	**Rte 24 NB ramp to Rte 104**	7,670	0.28	2147.6	30	0.02	3.580	0.200	0.964	0.150	1.065	0.226	1.075	0.168	1423.450	569.380	2702.514	421.592
149	**Rte 24 NB ramp from Rte 104**	5,580	0.28	1562.4	30	0.02	3.580	0.200	0.701	0.109	1.065	0.226	0.782	0.122	1423.450	569.380	1966.105	306.712
150	**Rte 104 Pleasant St E of Rte 24 NB Ramps**	26,560	0.25	6640.0	40	0.02	3.580	0.181	2.708	0.422	1.065	0.229	3.370	0.526	1423.450	569.380	8358.176	1303.875
151	**Rte 105 S of Rte 495 SB Ramps**	16,520	0.25	4130.0	40	0.02	3.580	0.181	1.684	0.263	1.065	0.229	2.096	0.327	1423.450	569.380	5198.685	810.995
152	**Rte 495 SB Ramp to Rte 105**	5,110	0.20	1022.0	30	0.02	3.580	0.200	0.462	0.072	1.065	0.226	0.513	0.080	1423.450	569.380	1287.345	200.826
153	**Rte 495 SB Ramp from Rte 105**	2,380	0.20	476.0	30	0.02	3.580	0.200	0.215	0.034	1.065	0.226	0.239	0.037	1423.450	569.380	599.585	93.535
154	**Rte 105 SB ramps to NB Ramps**	17,420	0.23	4006.6	40	0.02	3.580	0.181	1.637	0.255	1.065	0.229	2.034	0.317	1423.450	569.380	5044.568	786.953
155	**Rte 495 NB Ramp to Rte 105**	2,240	0.20	448.0	30	0.02	3.580	0.200	0.202	0.032	1.065	0.226	0.225	0.035	1423.450	569.380	564.316	88.033
156	**Rte 495 NB Ramp from Rte 105**	6,530	0.20	1306.0	30	0.02	3.580	0.200	0.590	0.092	1.065	0.226	0.655	0.102	1423.450	569.380	1645.081	256.633
157	**Rte 105 N of Rte 495 NB Ramps**	18,610	0.25	4652.5	40	0.02	3.580	0.181	1.897	0.296	1.065	0.229	2.361	0.368	1423.450	569.380	5856.388	913.596
	Total	1682610.000	67.190	568834.700					236.050	36.824			285.659	44.563			715510.505	111619.639

Notes: Daily to annual factor (6 days/week * 52 weeks per year / 365 days per year) = 85%

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2022 Alternative A Mitigated

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
1	**Bay St**	5,650	0.27	1525.5	35	0.02	3.580	0.188	0.645	0.101	1.065	0.223	0.754	0.118	1423.450	569.380	1919.847	299.496
2	**Broadway 138 N of Bay St**	12,790	0.33	4220.7	40	0.02	3.580	0.181	1.712	0.267	1.065	0.229	2.139	0.334	1423.450	569.380	5309.287	828.249
3	**Exeter St**	340	0.11	37.4	35	0.02	3.580	0.188	0.016	0.003	1.065	0.223	0.019	0.003	1423.450	569.380	47.244	7.370
4	**Broadway 138 Exeter to Washington**	17,600	0.41	7216.0	40	0.02	3.580	0.181	2.918	0.455	1.065	0.229	3.655	0.570	1423.450	569.380	9073.404	1415.451
5	**Washington E of Broadway**	4,320	0.17	734.4	35	0.02	3.580	0.188	0.314	0.049	1.065	0.223	0.364	0.057	1423.450	569.380	925.639	144.400
6	**Washington Court to Broadway**	10,280	0.31	3186.8	35	0.02	3.580	0.188	1.343	0.210	1.065	0.223	1.573	0.245	1423.450	569.380	4009.270	625.446
7	**Broadway 138 Washington to Court**	11,510	0.29	3337.9	40	0.02	3.580	0.181	1.357	0.212	1.065	0.229	1.693	0.264	1423.450	569.380	4200.015	655.202
8	**Washington Court to Martin**	19,830	0.05	991.5	35	0.02	3.580	0.188	0.454	0.071	1.065	0.223	0.500	0.078	1423.450	569.380	1261.891	196.855
9	**Washington Martin to Tremont**	18,850	0.10	1885.0	40	0.02	3.580	0.181	0.794	0.124	1.065	0.229	0.964	0.150	1423.450	569.380	2382.624	371.689
10	**Washington/Oak S of Tremont**	9,800	0.15	1470.0	35	0.02	3.580	0.188	0.631	0.098	1.065	0.223	0.729	0.114	1423.450	569.380	1853.796	289.192
11	**Tremont W of Washington**	15,770	0.15	2365.5	40	0.02	3.580	0.181	0.979	0.153	1.065	0.229	1.205	0.188	1423.450	569.380	2983.099	465.363
12	**Martin Washington to Cohannet**	8,420	0.19	1599.8	35	0.02	3.580	0.188	0.682	0.106	1.065	0.223	0.792	0.124	1423.450	569.380	2015.528	314.422
13	**Court Washington to PO Square**	7,340	0.20	1468.0	35	0.02	3.580	0.188	0.625	0.097	1.065	0.223	0.727	0.113	1423.450	569.380	1849.142	288.466
14	**PO Square**	2,870	0.07	200.9	35	0.02	3.580	0.188	0.090	0.014	1.065	0.223	0.101	0.016	1423.450	569.380	254.686	39.731
15	**Court PO Square to Broadway**	15,700	0.05	785.0	35	0.02	3.580	0.188	0.360	0.056	1.065	0.223	0.396	0.062	1423.450	569.380	999.077	155.856
16	**Cohannet PO Square to Martin**	6,430	0.08	514.4	35	0.02	3.580	0.188	0.227	0.035	1.065	0.223	0.257	0.040	1423.450	569.380	651.318	101.606
17	**Cohannet Martin to High**	10,210	0.05	510.5	35	0.02	3.580	0.188	0.234	0.036	1.065	0.223	0.258	0.040	1423.450	569.380	649.718	101.356
18	**High W of 44**	10,710	0.11	1178.1	35	0.02	3.580	0.188	0.512	0.080	1.065	0.223	0.586	0.091	1423.450	569.380	1488.175	232.155
19	**High E of 44**	8,890	0.22	1955.8	35	0.02	3.580	0.188	0.830	0.129	1.065	0.223	0.967	0.151	1423.450	569.380	2462.816	384.199
20	**Winthrop 44 High to Highland**	13,110	1.19	15600.9	40	0.02	3.580	0.181	6.254	0.976	1.065	0.229	7.885	1.230	1423.450	569.380	19594.842	3056.795
21	**Highland W of 44**	4,880	0.25	1220.0	35	0.02	3.580	0.188	0.516	0.081	1.065	0.223	0.603	0.094	1423.450	569.380	1535.689	239.567
22	**Highland E of 44**	4,670	0.25	1167.5	35	0.02	3.580	0.188	0.494	0.077	1.065	0.223	0.577	0.090	1423.450	569.380	1469.604	229.258
23	**Winthrop 44 S of Highland**	16,220	0.25	4055.0	40	0.02	3.580	0.181	1.654	0.258	1.065	0.229	2.058	0.321	1423.450	569.380	5104.278	796.267
24	**Winthrop 44 High to Main**	8,890	0.19	1689.1	40	0.02	3.580	0.181	0.694	0.108	1.065	0.229	0.859	0.134	1423.450	569.380	2128.034	331.973
25	**Weir 138 S of 44**	8,660	0.25	2165.0	35	0.02	3.580	0.188	0.916	0.143	1.065	0.223	1.070	0.167	1423.450	569.380	2725.219	425.134
26	**Broadway 138 Court to 44**	16,120	0.06	967.2	35	0.02	3.580	0.188	0.436	0.068	1.065	0.223	0.486	0.076	1423.450	569.380	1228.154	191.592
27	**Cohannet PO Square to Broadway**	14,390	0.09	1295.1	30	0.02	3.580	0.200	0.603	0.094	1.065	0.226	0.655	0.102	1423.450	569.380	1638.250	255.567
28	**Main St Broadway to Summer**	20,000	0.19	3800.0	35	0.02	3.580	0.188	1.619	0.253	1.065	0.223	1.881	0.293	1423.450	569.380	4787.478	746.847
29	**Union St**	540	0.13	70.2	35	0.02	3.580	0.188	0.030	0.005	1.065	0.223	0.035	0.005	1423.450	569.380	88.591	13.820
30	**Summer St 140 Main to Ingell**	9,050	0.52	4706.0	40	0.02	3.580	0.181	1.898	0.296	1.065	0.229	2.382	0.372	1423.450	569.380	5915.211	922.773
31	**Ingell S of Summer 140**	8,700	0.25	2175.0	35	0.02	3.580	0.188	0.921	0.144	1.065	0.223	1.075	0.168	1423.450	569.380	2737.806	427.098
32	**County 140 Ingell to Williams**	16,430	0.33	5421.9	40	0.02	3.580	0.181	2.200	0.343	1.065	0.229	2.748	0.429	1423.450	569.380	6820.296	1063.966
33	**44 Union to Longmeadow-Owen**	17,110	0.72	12319.2	40	0.02	3.580	0.181	4.953	0.773	1.065	0.229	6.231	0.972	1423.450	569.380	15478.894	2414.707
34	**Longmeadow**	11,060	0.50	5530.0	35	0.02	3.580	0.188	2.316	0.361	1.065	0.223	2.726	0.425	1423.450	569.380	6951.310	1084.404
35	**Dean 44 E of Longmeadow-Owen**	29,070	0.15	4360.5	40	0.02	3.580	0.181	1.804	0.281	1.065	0.229	2.220	0.346	1423.450	569.380	5498.966	857.839
36	**Owen Dean to Williams**	14,150	0.55	7782.5	35	0.02	3.580	0.188	3.257	0.508	1.065	0.223	3.835	0.598	1423.450	569.380	9781.509	1525.915
37	**Williams N of Owen**	7,390	0.17	1256.3	35	0.02	3.580	0.188	0.537	0.084	1.065	0.223	0.622	0.097	1423.450	569.380	1583.443	247.017
38	**Williams Owen to 140**	3,760	0.14	526.4	35	0.02	3.580	0.188	0.226	0.035	1.065	0.223	0.261	0.041	1423.450	569.380	664.054	103.592
39	**Riverway Ext**	8,710	0.18	1567.8	35	0.02	3.580	0.188	0.669	0.104	1.065	0.223	0.776	0.121	1423.450	569.380	1975.612	308.195
40	**County 140 Williams to Riverway**	12,680	0.12	1521.6	40	0.02	3.580	0.181	0.635	0.099	1.065	0.229	0.776	0.121	1423.450	569.380	1921.079	299.688
41	**County 140 Riverway to Johnson**	20,300	0.52	10556.0	40	0.02	3.580	0.181	4.257	0.664	1.065	0.229	5.343	0.833	1423.450	569.380	13268.374	2069.866
42	**Johnson N of 140**	160	0.47	75.2	35	0.02	3.580	0.188	0.032	0.005	1.065	0.223	0.037	0.006	1423.450	569.380	94.536	14.748
43	**Johnson S of 140**	660	0.26	171.6	35	0.02	3.580	0.188	0.073	0.011	1.065	0.223	0.085	0.013	1423.450	569.380	215.980	33.693
44	**Trucchis Driveway**	1,610	0.04	64.4	20	0.02	3.580	0.240	0.038	0.006	1.065	0.247	0.036	0.006	1423.450	569.380	82.243	12.830
45	**County 140 Johnson to Hart**	19,920	0.27	5378.4	40	0.02	3.580	0.181	2.190	0.342	1.065	0.229	2.728	0.426	1423.450	569.380	6768.733	1055.922
46	**Hart W of 140**	9,830	0.15	1474.5	35	0.02	3.580	0.188	0.633	0.099	1.065	0.223	0.731	0.114	1423.450	569.380	1859.471	290.078
47	**Hart 140 to Poole**	8,710	0.73	6358.3	35	0.02	3.580	0.188	2.654	0.414	1.065	0.223	3.132	0.489	1423.450	569.380	7989.005	1246.285
48	**County 140 Hart to Erika**	24,280	0.41	9954.8	40	0.02	3.580	0.181	4.026	0.628	1.065	0.229	5.042	0.786	1423.450	569.380	12517.173	1952.679
49	**Erika Drive**	14,770	0.14	2067.8	35	0.02	3.580	0.188	0.889	0.139	1.065	0.223	1.026	0.160	1423.450	569.380	2608.532	406.931
50	**BPRTHS Driveway S End**	3,400	0.35	1190.0	20	0.02	3.580	0.240	0.637	0.099	1.065	0.247	0.650	0.101	1423.450	569.380	1496.741	233.492
51	**BPRTHS Driveway N End**	3,790	0.30	1137.0	20	0.02	3.580	0.240	0.610	0.095	1.065	0.247	0.622	0.097	1423.450	569.380	1430.551	223.166
52	**Hess Station opposite BPRTHS Driveway**	2,410	0.02	48.2	20	0.02	3.580	0.240	0.031	0.005	1.065	0.247	0.028	0.004	1423.450	569.380	62.605	9.766
53	**County 140 Erika to BPRTHS Driveway**	23,830	0.12	2859.6	40	0.02	3.580	0.181	1.193	0.186	1.065	0.229	1.459	0.228	1423.450	569.380	3610.356	563.216
54	**County 140 BPRTHS Driveway to Mozzone**	23,940	0.21	5027.4	40	0.02	3.580	0.181	2.059	0.321	1.065	0.229	2.554	0.398	1423.450	569.380	6331.636	987.735
55	**Mozzone Blvd**	5,740	0.21	1205.4	35	0.02	3.580	0.188	0.512	0.080	1.065	0.223	0.596	0.093	1423.450	569.380	1518.112	236.825
56	**County 140 Mozzone to 24 SB Ramp**	26,130	0.24	6271.2	40	0.02	3.580	0.181	2.560	0.399	1.065	0.229	3.183	0.497	1423.450	569.380	7894.856	1231.598
57	**County 140 SB ramp to NB Ramp**	41,850	0.17	7114.5	40	0.02	3.580	0.181	2.931	0.457	1.065	0.229	3.619	0.565	1423.450	569.380	8967.132	1398.873
58	**County 140 NB Ramp to Stevens St**	52,130	0.42	21894.6	40	0.02	3.580	0.181	8.851	1.381	1.065	0.229	11.088	1.730	1423.450	569.380	27529.178	4294.552
59	**24 SB off/on ramp**	27,670	0.21	5810.7	30	0.02	3.580	0.200	2.623	0.409	1.065	0.226	2.913	0.454	1423.450	569.380	7318.144	1141.631
60	**24 NB off/on ramp**	19,890	0.22	4375.8	30	0.02	3.580	0.200	1.973	0.308	1.065	0.226	2.193	0.342	1423.450	569.380	5510.169	859.586
61	**Poole St**	5,200	0.17	884.0	35	0.02	3.580	0.188	0.378	0.059	1.065	0.223	0.438	0.068	1423.450	569.380	1114.196	173.815
62	**Middleboro Poole to Stevens**	10,990	0.47	5165.3	35	0.02	3.580	0.188	2.165	0.338	1.065	0.223	2.547	0.397	1423.450	569.380	6493.450	1012.978
63	**Stevens Middleboro to Pinehill**	3,610	0.27	974.7	35	0.02	3.580	0.188	0.412	0.064	1.065	0.223	0.482	0.075	1423.450	569.380	1226.663	191.359
64	**Secondary Site Driveway**	2,040	0.25	510.0	20	0.02	3.580	0.240	0.274	0.043	1.065	0.247	0.279	0.044	1423.450	569.380	641.968	100.147
65	**Stevens Pinehill to O'Connell**	9,120	0.60	5472.0	35	0.02	3.580	0.188	2.288	0.357	1.065	0.223	2.696	0.421	1423.450	569.380	6876.813	1072.783
66	**O'Connell W of Stevens**	16,580	0.46	7626.8	35	0.02	3.580	0.188	3.197	0.499	1.065	0.223	3.760	0.587	1423.450	569.380	9588.181	1495.756
67	**Cotley St**	4,410	0.40	1764.0	35	0.02	3.580	0.188	0.741	0.116	1.065	0.223	0.870	0.136	1423.450	569.380	2218.149	346.031
68	**Middleboro Stevens to Pinehill**	7,550	0.32	2416.0	35	0.02	3.580	0.188	1.018	0.159	1.065	0.223	1.193	0.186	1423.450	569.380	3039.325	474.135
69	**Caswell St**	5,210	0.16	833.6	35	0.02	3.580	0.188	0.357	0.056	1.065	0.223	0.413	0.064	1423.450	569.380	1050.939	163.946
70	**Pinehill Stevens to Middleboro**	5,080	0.27	1371.6	35	0.02	3.580	0.188	0.580	0.090	1.065	0.223	0.678	0.106	1423.450	569.380	1726.163	269.281
71	**Middleboro Caswell to Liberty**	9,620	0.60	5772.0	35	0.02	3.580	0.188	2.413	0.376	1.065	0.223	2.844	0.444	1423.450	569.380	7253.831	1131.598
72	**Middleboro E of Liberty**	4,880	0.19	927.2	35	0.02	3.580	0.188	0.395	0.062	1.065	0.223	0.459	0.072	1423.450	569.380	1168.145	182.231

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2022 Alternative A Mitigated

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
73	**Liberty S of Middleboro**	3,700	0.68	2516.0	35	0.02	3.580	0.188	1.051	0.164	1.065	0.223	1.239	0.193	1423.450	569.380	3161.496	493.193
74	**Old Colony Ave N of Middleboro**	9,570	0.19	1818.3	35	0.02	3.580	0.188	0.775	0.121	1.065	0.223	0.900	0.140	1423.450	569.380	2290.808	357.366
75	**Stevens S of O'Connell**	26,450	0.13	3438.5	35	0.02	3.580	0.188	1.483	0.231	1.065	0.223	1.708	0.266	1423.450	569.380	4339.319	676.934
76	**New Ramp**	0	0.10	0.0	30	0.02	3.580	0.200	0.000	0.000	1.065	0.226	0.000	0.000	1423.450	569.380	0.000	0.000
77	**Stevens Street Connector**	22,200	0.24	5328.0	30	0.02	3.580	0.200	2.398	0.374	1.065	0.226	2.669	0.416	1423.450	569.380	6707.455	1046.363
78	**Galleria Mall Drive N**	6,170	0.20	1234.0	35	0.02	3.580	0.188	0.525	0.082	1.065	0.223	0.611	0.095	1423.450	569.380	1554.387	242.484
79	**Galleria Mall Drive S**	6,940	0.23	1596.2	35	0.02	3.580	0.188	0.677	0.106	1.065	0.223	0.789	0.123	1423.450	569.380	2009.719	313.516
80	**Galleria Mall Drive**	11,880	0.07	831.6	35	0.02	3.580	0.188	0.371	0.058	1.065	0.223	0.417	0.065	1423.450	569.380	1054.242	164.462
81	**140 NB Ramp to Stevens St Ext**	2,950	0.23	678.5	30	0.02	3.580	0.200	0.306	0.048	1.065	0.226	0.340	0.053	1423.450	569.380	854.275	133.267
82	**Steven St Ext Ramp to 140 NB**	13,330	0.21	2799.3	30	0.02	3.580	0.200	1.264	0.197	1.065	0.226	1.403	0.219	1423.450	569.380	3525.510	549.980
83	**140 SB Ramp to Stevens St Connector**	8,450	0.15	1267.5	30	0.02	3.580	0.200	0.577	0.090	1.065	0.226	0.637	0.099	1423.450	569.380	1598.427	249.355
84	**Galleria Mall Dr Ramp to 140 SB**	4,280	0.17	727.6	30	0.02	3.580	0.200	0.330	0.052	1.065	0.226	0.365	0.057	1423.450	569.380	917.069	143.063
85	**Stevens St Mall Connector Overpass WB**	1,860	0.20	372.0	30	0.02	3.580	0.200	0.168	0.026	1.065	0.226	0.187	0.029	1423.450	569.380	468.584	73.099
86	**Stevens St Mall Connector Overpass EB**	1,940	0.20	388.0	30	0.02	3.580	0.200	0.175	0.027	1.065	0.226	0.195	0.030	1423.450	569.380	488.738	76.243
87	**Myricks St 79 S of 140**	7,990	0.30	2397.0	40	0.02	3.580	0.181	0.974	0.152	1.065	0.229	1.215	0.190	1423.450	569.380	3015.858	470.474
88	**Myricks St 79 N of 140**	11,590	0.30	3477.0	40	0.02	3.580	0.181	1.413	0.220	1.065	0.229	1.763	0.275	1423.450	569.380	4374.693	682.452
89	**Myricks St 79 under 140**	9,820	0.12	1178.4	40	0.02	3.580	0.181	0.492	0.077	1.065	0.229	0.601	0.094	1423.450	569.380	1487.776	232.093
90	**140 SB Ramp to Myricks St 79**	3,760	0.21	789.6	30	0.02	3.580	0.200	0.356	0.056	1.065	0.226	0.396	0.062	1423.450	569.380	994.442	155.133
91	**Myricks St 79 Ramp to 140 SB**	1,630	0.24	391.2	30	0.02	3.580	0.200	0.176	0.027	1.065	0.226	0.196	0.031	1423.450	569.380	492.484	76.828
92	**140 NB Ramp to Myricks St 79**	1,550	0.17	263.5	30	0.02	3.580	0.200	0.120	0.019	1.065	0.226	0.132	0.021	1423.450	569.380	332.116	51.810
93	**Myricks St 79 Ramp to 140 NB**	3,840	0.19	729.6	30	0.02	3.580	0.200	0.330	0.051	1.065	0.226	0.366	0.057	1423.450	569.380	919.196	143.395
94	**Rte 44 West of Orchard**	37,540	0.25	9385.0	40	0.02	3.580	0.181	3.827	0.597	1.065	0.229	4.763	0.743	1423.450	569.380	11813.476	1842.902
95	**Orchard N of 44**	8,180	0.25	2045.0	35	0.02	3.580	0.188	0.866	0.135	1.065	0.223	1.011	0.158	1423.450	569.380	2574.167	401.570
96	**Orchard S of 44**	10,560	0.25	2640.0	35	0.02	3.580	0.188	1.117	0.174	1.065	0.223	1.305	0.204	1423.450	569.380	3323.130	518.408
97	**Rte 44 Orchard to Hill**	30,980	1.25	38725.0	40	0.02	3.580	0.181	15.521	2.421	1.065	0.229	19.571	3.053	1423.450	569.380	48637.514	7587.452
98	**Hill N of 44**	1,300	0.25	325.0	35	0.02	3.580	0.188	0.138	0.021	1.065	0.223	0.161	0.025	1423.450	569.380	409.097	63.819
99	**Hill S of 44**	1,480	0.25	370.0	35	0.02	3.580	0.188	0.157	0.024	1.065	0.223	0.183	0.029	1423.450	569.380	465.742	72.656
100	**Rte 44 Hill to Church**	22,820	0.46	10497.2	40	0.02	3.580	0.181	4.239	0.661	1.065	0.229	5.315	0.829	1423.450	569.380	13196.761	2058.695
101	**Church N of 44**	2,620	0.25	655.0	35	0.02	3.580	0.188	0.277	0.043	1.065	0.223	0.324	0.051	1423.450	569.380	824.489	128.620
102	**Church S of 44**	3,340	0.25	835.0	35	0.02	3.580	0.188	0.353	0.055	1.065	0.223	0.413	0.064	1423.450	569.380	1051.066	163.966
103	**Rte 44 Church to Richmond**	22,520	0.88	19817.6	40	0.02	3.580	0.181	7.957	1.241	1.065	0.229	10.020	1.563	1423.450	569.380	24896.161	3883.801
104	**Richmond N of 44**	2,470	0.25	617.5	35	0.02	3.580	0.188	0.261	0.041	1.065	0.223	0.305	0.048	1423.450	569.380	777.285	121.256
105	**Richmond S of 44**	940	0.25	235.0	35	0.02	3.580	0.188	0.099	0.016	1.065	0.223	0.116	0.018	1423.450	569.380	295.809	46.146
106	**Rte 44 Richmond to 495 SB ramps**	19,930	1.18	23517.4	40	0.02	3.580	0.181	9.428	1.471	1.065	0.229	11.886	1.854	1423.450	569.380	29538.168	4607.954
107	**495 SB Ramps (off) to Rte 44**	6,660	0.25	1665.0	30	0.02	3.580	0.200	0.749	0.117	1.065	0.226	0.834	0.130	1423.450	569.380	2095.838	326.951
108	**495 SB Ramps (on) from Rte 44**	3,790	0.25	947.5	30	0.02	3.580	0.200	0.426	0.066	1.065	0.226	0.475	0.074	1423.450	569.380	1192.676	186.058
109	**Rte 44 SB Ramps to NB Ramps**	22,040	0.17	3746.8	40	0.02	3.580	0.181	1.543	0.241	1.065	0.229	1.906	0.297	1423.450	569.380	4722.475	736.706
110	**495 NB Ramps (off) to Rte 44**	3,090	0.25	772.5	30	0.02	3.580	0.200	0.347	0.054	1.065	0.226	0.387	0.060	1423.450	569.380	972.393	151.693
111	**495 NB Ramps (on) from Rte 44**	6,930	0.25	1732.5	30	0.02	3.580	0.200	0.779	0.122	1.065	0.226	0.868	0.135	1423.450	569.380	2180.804	340.205
112	**Rte 44 NB Ramps to Rotary**	25,160	0.17	4277.2	40	0.02	3.580	0.181	1.762	0.275	1.065	0.229	2.176	0.339	1423.450	569.380	5390.993	840.995
113	**Bedford 28/18 N of Rotary**	14,810	0.25	3702.5	40	0.02	3.580	0.181	1.510	0.236	1.065	0.229	1.879	0.293	1423.450	569.380	4660.564	727.048
114	**Rte 44 E of Rotary**	20,350	0.25	5087.5	40	0.02	3.580	0.181	2.075	0.324	1.065	0.229	2.582	0.403	1423.450	569.380	6403.949	999.016
115	**W. Grove 28 SE of Rotary**	15,080	0.25	3770.0	40	0.02	3.580	0.181	1.537	0.240	1.065	0.229	1.913	0.298	1423.450	569.380	4745.531	740.303
116	**Bedford 18 S of Rotary to 495 NB Ramps**	11,560	0.17	1965.2	40	0.02	3.580	0.181	0.810	0.126	1.065	0.229	1.000	0.156	1423.450	569.380	2476.943	386.403
117	**Bedford 18 S of Rotary NB to SB ramps**	13,190	0.19	2506.1	40	0.02	3.580	0.181	1.029	0.161	1.065	0.229	1.274	0.199	1423.450	569.380	3157.342	492.545
118	**495 NB Ramps (off) to Rte 18**	2,950	0.28	826.0	30	0.02	3.580	0.200	0.371	0.058	1.065	0.226	0.413	0.065	1423.450	569.380	1039.428	162.151
119	**495 NB Ramps (on) from Rte 18**	2,940	0.28	823.2	30	0.02	3.580	0.200	0.369	0.058	1.065	0.226	0.412	0.064	1423.450	569.380	1035.905	161.601
120	**495 SB Ramps (off) to Rte 18**	7,200	0.28	2016.0	30	0.02	3.580	0.200	0.905	0.141	1.065	0.226	1.009	0.157	1423.450	569.380	2536.910	395.758
121	**495 SB Ramps (on) from Rte 18**	2,010	0.28	562.8	30	0.02	3.580	0.200	0.253	0.039	1.065	0.226	0.282	0.044	1423.450	569.380	708.221	110.482
122	**Bedford 495 SB Ramps to Taunton St**	14,130	0.46	6499.8	40	0.02	3.580	0.181	2.625	0.409	1.065	0.229	3.291	0.513	1423.450	569.380	8171.351	1274.731
123	**Taunton St E of Rte 18**	520	0.25	130.0	35	0.02	3.580	0.188	0.055	0.009	1.065	0.223	0.064	0.010	1423.450	569.380	163.639	25.528
124	**Taunton St W of Rte 18**	2,660	25.00	66500.0	35	0.02	3.580	0.188	27.568	4.301	1.065	0.223	32.695	5.100	1423.450	569.380	83478.079	13022.580
125	**Bedford 18 S of Taunton St.**	10,560	0.25	2640.0	40	0.02	3.580	0.181	1.077	0.168	1.065	0.229	1.340	0.209	1423.450	569.380	3323.130	518.408
126	**Rte 138 N of 495**	23,710	0.25	5927.5	40	0.02	3.580	0.181	2.417	0.377	1.065	0.229	3.008	0.469	1423.450	569.380	7461.309	1163.964
127	**Rte 138 ramp to 495 NB**	5,730	0.27	1547.1	30	0.02	3.580	0.200	0.695	0.108	1.065	0.226	0.775	0.121	1423.450	569.380	1947.030	303.737
128	**495 NB ramp to Rte 138**	3,350	0.27	904.5	30	0.02	3.580	0.200	0.406	0.063	1.065	0.226	0.453	0.071	1423.450	569.380	1138.316	177.577
129	**Rte 138 NB Ramps to SB ramps**	24,450	0.15	3667.5	40	0.02	3.580	0.181	1.517	0.237	1.065	0.229	1.868	0.291	1423.450	569.380	4625.033	721.505
130	**Rte 138 ramp to 495 SB**	3,560	0.27	961.2	30	0.02	3.580	0.200	0.432	0.067	1.065	0.226	0.481	0.075	1423.450	569.380	1209.673	188.709
131	**495 SB ramp to 138**	7,380	0.27	1992.6	30	0.02	3.580	0.200	0.895	0.140	1.065	0.226	0.998	0.156	1423.450	569.380	2507.693	391.200
132	**Rte 138 S of 495**	25,970	0.25	6492.5	40	0.02	3.580	0.181	2.648	0.413	1.065	0.229	3.295	0.514	1423.450	569.380	8172.509	1274.911
133	**Padelford St N of 24 SB Ramps**	8,310	0.25	2077.5	35	0.02	3.580	0.188	0.879	0.137	1.065	0.223	1.027	0.160	1423.450	569.380	2615.077	407.952
134	**Rte 24 SB Ramp to Padelford St**	4,590	0.20	918.0	30	0.02	3.580	0.200	0.415	0.065	1.065	0.226	0.460	0.072	1423.450	569.380	1156.343	180.390
135	**Rte 24 SB Ramp from Padelford St**	860	0.20	172.0	30	0.02	3.580	0.200	0.078	0.012	1.065	0.226	0.086	0.013	1423.450	569.380	216.657	33.798
136	**Padelford St SB Ramps to NB Ramps**	5,550	0.29	1609.5	35	0.02	3.580	0.188	0.679	0.106	1.065	0.223	0.795	0.124	1423.450	569.380	2025.202	315.932
137	**Rte 24 NB Ramp to Padelford St**	780	0.20	156.0	30	0.02	3.580	0.200	0.070	0.011	1.065	0.226	0.078	0.012	1423.450	569.380	196.503	30.654
138	**Rte 24 NB Ramp from Padelford St**	4,700	0.20	940.0	30	0.02	3.580	0.200	0.425	0.066	1.065	0.226	0.471	0.074	1423.450	569.380	1184.055	184.713
139	**Padelford St S of 24 NB Ramps**	4,030	0.25	1007.5	35	0.02	3.580	0.188	0.426	0.067	1.065	0.223	0.498	0.078	1423.450	569.380	1268.202	197.840
140	**Bedford St Rte 18 N of Rte 79**	11,250	0.25	2812.5	40	0.02	3.580	0.181	1.147	0.179	1.065	0.229	1.427	0.223	1423.450	569.380	3540.267	552.282
141	**Bedford St Rte 18 S of Rte 79**	7,810	0.25	1952.5	40	0.02	3.580	0.181	0.796	0.124	1.065	0.229	0.991	0.155	1423.450	569.380	2457.732	383.406
142	**RI Rd Rte 79 W of Rte 18**	9,700	0.25	2425.0	40	0.02	3.580	0.181	0.989	0.154	1.065	0.229	1.231	0.192	1423.450	569.380	3052.497	476.189
143	**RI Rd Rte 79 E of Rte 18**	7,480	0.25	1870.0	40	0.02	3.580	0.181	0.763	0.119	1.065	0.229	0.949	0.148	1423.450	569.380	2353.884	367.206
144	**Rte 104 Pleasant St W of Rte 24 SB Ramps**	11,820	0.25	2955.0	40	0.02	3.580	0.181	1.205	0.188	1.065	0.229	1.500	0.234	1423.450	569.380	3719.640	580.264

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2022 Alternative A Mitigated

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
145	**Rte 24 SB Ramp to Rte 104**	7,470	0.28	2091.6	30	0.02	3.580	0.200	0.939	0.146	1.065	0.226	1.047	0.163	1423.450	569.380	2632.044	410.599
146	**Rte 24 SB Ramp from Rte 104**	8,040	0.28	2251.2	30	0.02	3.580	0.200	1.010	0.158	1.065	0.226	1.127	0.176	1423.450	569.380	2832.883	441.930
147	**Rte 104 SB ramps to NB Ramps**	19,040	0.23	4379.2	40	0.02	3.580	0.181	1.789	0.279	1.065	0.229	2.223	0.347	1423.450	569.380	5513.696	860.137
148	**Rte 24 NB ramp to Rte 104**	7,670	0.28	2147.6	30	0.02	3.580	0.200	0.964	0.150	1.065	0.226	1.075	0.168	1423.450	569.380	2702.514	421.592
149	**Rte 24 NB ramp from Rte 104**	5,580	0.28	1562.4	30	0.02	3.580	0.200	0.701	0.109	1.065	0.226	0.782	0.122	1423.450	569.380	1966.105	306.712
150	**Rte 104 Pleasant St E of Rte 24 NB Ramps**	26,560	0.25	6640.0	40	0.02	3.580	0.181	2.708	0.422	1.065	0.229	3.370	0.526	1423.450	569.380	8358.176	1303.875
151	**Rte 105 S of Rte 495 SB Ramps**	16,520	0.25	4130.0	40	0.02	3.580	0.181	1.684	0.263	1.065	0.229	2.096	0.327	1423.450	569.380	5198.685	810.995
152	**Rte 495 SB Ramp to Rte 105**	5,110	0.20	1022.0	30	0.02	3.580	0.200	0.462	0.072	1.065	0.226	0.513	0.080	1423.450	569.380	1287.345	200.826
153	**Rte 495 SB Ramp from Rte 105**	2,380	0.20	476.0	30	0.02	3.580	0.200	0.215	0.034	1.065	0.226	0.239	0.037	1423.450	569.380	599.585	93.535
154	**Rte 105 SB ramps to NB Ramps**	17,420	0.23	4006.6	40	0.02	3.580	0.181	1.637	0.255	1.065	0.229	2.034	0.317	1423.450	569.380	5044.568	786.953
155	**Rte 495 NB Ramp to Rte 105**	2,240	0.20	448.0	30	0.02	3.580	0.200	0.202	0.032	1.065	0.226	0.225	0.035	1423.450	569.380	564.316	88.033
156	**Rte 495 NB Ramp from Rte 105**	6,530	0.20	1306.0	30	0.02	3.580	0.200	0.590	0.092	1.065	0.226	0.655	0.102	1423.450	569.380	1645.081	256.633
157	**Rte 105 N of Rte 495 NB Ramps**	18,610	0.25	4652.5	40	0.02	3.580	0.181	1.897	0.296	1.065	0.229	2.361	0.368	1423.450	569.380	5856.388	913.596
	Total	1682620.000	67.190	568691.600					236.011	36.818			285.598	44.553			715330.884	111591.618

Notes: Daily to annual factor (6 days/week * 52 weeks per year / 365 days per year) = 85%

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2022 Alternative B

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
1	**Bay St**	5,650	0.27	1525.5	35	0.02	3.580	0.188	0.645	0.101	1.065	0.223	0.754	0.118	1423.450	569.380	1919.847	299.496
2	**Broadway 138 N of Bay St**	12,790	0.33	4220.7	40	0.02	3.580	0.181	1.712	0.267	1.065	0.229	2.139	0.334	1423.450	569.380	5309.287	828.249
3	**Exeter St**	340	0.11	37.4	35	0.02	3.580	0.188	0.016	0.003	1.065	0.223	0.019	0.003	1423.450	569.380	47.244	7.370
4	**Broadway 138 Exeter to Washington**	17,600	0.41	7216.0	40	0.02	3.580	0.181	2.918	0.455	1.065	0.229	3.655	0.570	1423.450	569.380	9073.404	1415.451
5	**Washington E of Broadway**	4,320	0.17	734.4	35	0.02	3.580	0.188	0.314	0.049	1.065	0.223	0.364	0.057	1423.450	569.380	925.639	144.400
6	**Washington Court to Broadway**	10,280	0.31	3186.8	35	0.02	3.580	0.188	1.343	0.210	1.065	0.223	1.573	0.245	1423.450	569.380	4009.270	625.446
7	**Broadway 138 Washington to Court**	11,510	0.29	3337.9	40	0.02	3.580	0.181	1.357	0.212	1.065	0.229	1.693	0.264	1423.450	569.380	4200.015	655.202
8	**Washington Court to Martin**	19,830	0.05	991.5	35	0.02	3.580	0.188	0.454	0.071	1.065	0.223	0.500	0.078	1423.450	569.380	1261.891	196.855
9	**Washington Martin to Tremont**	18,850	0.10	1885.0	40	0.02	3.580	0.181	0.794	0.124	1.065	0.229	0.964	0.150	1423.450	569.380	2382.624	371.689
10	**Washington/Oak S of Tremont**	9,800	0.15	1470.0	35	0.02	3.580	0.188	0.631	0.098	1.065	0.223	0.729	0.114	1423.450	569.380	1853.796	289.192
11	**Tremont W of Washington**	15,770	0.15	2365.5	40	0.02	3.580	0.181	0.979	0.153	1.065	0.229	1.205	0.188	1423.450	569.380	2983.099	465.363
12	**Martin Washington to Cohannet**	8,420	0.19	1599.8	35	0.02	3.580	0.188	0.682	0.106	1.065	0.223	0.792	0.124	1423.450	569.380	2015.528	314.422
13	**Court Washington to PO Square**	7,340	0.20	1468.0	35	0.02	3.580	0.188	0.625	0.097	1.065	0.223	0.727	0.113	1423.450	569.380	1849.142	288.466
14	**PO Square**	2,870	0.07	200.9	35	0.02	3.580	0.188	0.090	0.014	1.065	0.223	0.101	0.016	1423.450	569.380	254.686	39.731
15	**Court PO Square to Broadway**	15,700	0.05	785.0	35	0.02	3.580	0.188	0.360	0.056	1.065	0.223	0.396	0.062	1423.450	569.380	999.077	155.856
16	**Cohannet PO Square to Martin**	6,430	0.08	514.4	35	0.02	3.580	0.188	0.227	0.035	1.065	0.223	0.257	0.040	1423.450	569.380	651.318	101.606
17	**Cohannet Martin to High**	10,210	0.05	510.5	35	0.02	3.580	0.188	0.234	0.036	1.065	0.223	0.258	0.040	1423.450	569.380	649.718	101.356
18	**High W of 44**	10,710	0.11	1178.1	35	0.02	3.580	0.188	0.512	0.080	1.065	0.223	0.586	0.091	1423.450	569.380	1488.175	232.155
19	**High E of 44**	8,890	0.22	1955.8	35	0.02	3.580	0.188	0.830	0.129	1.065	0.223	0.967	0.151	1423.450	569.380	2462.816	384.199
20	**Winthrop 44 High to Highland**	13,110	1.19	15600.9	40	0.02	3.580	0.181	6.254	0.976	1.065	0.229	7.885	1.230	1423.450	569.380	19594.842	3056.795
21	**Highland W of 44**	4,880	0.25	1220.0	35	0.02	3.580	0.188	0.516	0.081	1.065	0.223	0.603	0.094	1423.450	569.380	1535.689	239.567
22	**Highland E of 44**	4,670	0.25	1167.5	35	0.02	3.580	0.188	0.494	0.077	1.065	0.223	0.577	0.090	1423.450	569.380	1469.604	229.258
23	**Winthrop 44 S of Highland**	16,220	0.25	4055.0	40	0.02	3.580	0.181	1.654	0.258	1.065	0.229	2.058	0.321	1423.450	569.380	5104.278	796.267
24	**Winthrop 44 High to Main**	8,890	0.19	1689.1	40	0.02	3.580	0.181	0.694	0.108	1.065	0.229	0.859	0.134	1423.450	569.380	2128.034	331.973
25	**Weir 138 S of 44**	8,660	0.25	2165.0	35	0.02	3.580	0.188	0.916	0.143	1.065	0.223	1.070	0.167	1423.450	569.380	2725.219	425.134
26	**Broadway 138 Court to 44**	16,120	0.06	967.2	35	0.02	3.580	0.188	0.436	0.068	1.065	0.223	0.486	0.076	1423.450	569.380	1228.154	191.592
27	**Cohannet PO Square to Broadway**	14,390	0.09	1295.1	30	0.02	3.580	0.200	0.603	0.094	1.065	0.226	0.655	0.102	1423.450	569.380	1638.250	255.567
28	**Main St Broadway to Summer**	20,000	0.19	3800.0	35	0.02	3.580	0.188	1.619	0.253	1.065	0.223	1.881	0.293	1423.450	569.380	4787.478	746.847
29	**Union St**	540	0.13	70.2	35	0.02	3.580	0.188	0.030	0.005	1.065	0.223	0.035	0.005	1423.450	569.380	88.591	13.820
30	**Summer St 140 Main to Ingell**	9,050	0.52	4706.0	40	0.02	3.580	0.181	1.898	0.296	1.065	0.229	2.382	0.372	1423.450	569.380	5915.211	922.773
31	**Ingell S of Summer 140**	8,700	0.25	2175.0	35	0.02	3.580	0.188	0.921	0.144	1.065	0.223	1.075	0.168	1423.450	569.380	2737.806	427.098
32	**County 140 Ingell to Williams**	16,430	0.33	5421.9	40	0.02	3.580	0.181	2.200	0.343	1.065	0.229	2.748	0.429	1423.450	569.380	6820.296	1063.966
33	**44 Union to Longmeadow-Owen**	17,110	0.72	12319.2	40	0.02	3.580	0.181	4.953	0.773	1.065	0.229	6.231	0.972	1423.450	569.380	15478.894	2414.707
34	**Longmeadow**	11,060	0.50	5530.0	35	0.02	3.580	0.188	2.316	0.361	1.065	0.223	2.726	0.425	1423.450	569.380	6951.310	1084.404
35	**Dean 44 E of Longmeadow-Owen**	29,070	0.15	4360.5	40	0.02	3.580	0.181	1.804	0.281	1.065	0.229	2.220	0.346	1423.450	569.380	5498.966	857.839
36	**Owen Dean to Williams**	14,150	0.55	7782.5	35	0.02	3.580	0.188	3.257	0.508	1.065	0.223	3.835	0.598	1423.450	569.380	9781.509	1525.915
37	**Williams N of Owen**	7,390	0.17	1256.3	35	0.02	3.580	0.188	0.537	0.084	1.065	0.223	0.622	0.097	1423.450	569.380	1583.443	247.017
38	**Williams Owen to 140**	3,760	0.14	526.4	35	0.02	3.580	0.188	0.226	0.035	1.065	0.223	0.261	0.041	1423.450	569.380	664.054	103.592
39	**Riverway Ext**	8,710	0.18	1567.8	35	0.02	3.580	0.188	0.669	0.104	1.065	0.223	0.776	0.121	1423.450	569.380	1975.612	308.195
40	**County 140 Williams to Riverway**	12,680	0.12	1521.6	40	0.02	3.580	0.181	0.635	0.099	1.065	0.229	0.776	0.121	1423.450	569.380	1921.079	299.688
41	**County 140 Riverway to Johnson**	20,300	0.52	10556.0	40	0.02	3.580	0.181	4.257	0.664	1.065	0.229	5.343	0.833	1423.450	569.380	13268.374	2069.866
42	**Johnson N of 140**	160	0.47	75.2	35	0.02	3.580	0.188	0.032	0.005	1.065	0.223	0.037	0.006	1423.450	569.380	94.536	14.748
43	**Johnson S of 140**	660	0.26	171.6	35	0.02	3.580	0.188	0.073	0.011	1.065	0.223	0.085	0.013	1423.450	569.380	215.980	33.693
44	**Trucchis Driveway**	1,610	0.04	64.4	20	0.02	3.580	0.240	0.038	0.006	1.065	0.247	0.036	0.006	1423.450	569.380	82.243	12.830
45	**County 140 Johnson to Hart**	19,920	0.27	5378.4	40	0.02	3.580	0.181	2.190	0.342	1.065	0.229	2.728	0.426	1423.450	569.380	6768.733	1055.922
46	**Hart W of 140**	9,830	0.15	1474.5	35	0.02	3.580	0.188	0.633	0.099	1.065	0.223	0.731	0.114	1423.450	569.380	1859.471	290.078
47	**Hart 140 to Poole**	8,710	0.73	6358.3	35	0.02	3.580	0.188	2.654	0.414	1.065	0.223	3.132	0.489	1423.450	569.380	7989.005	1246.285
48	**County 140 Hart to Erika**	24,280	0.41	9954.8	40	0.02	3.580	0.181	4.026	0.628	1.065	0.229	5.042	0.786	1423.450	569.380	12517.173	1952.679
49	**Erika Drive**	14,770	0.14	2067.8	35	0.02	3.580	0.188	0.889	0.139	1.065	0.223	1.026	0.160	1423.450	569.380	2608.532	406.931
50	**BPRTHS Driveway S End**	3,400	0.35	1190.0	20	0.02	3.580	0.240	0.637	0.099	1.065	0.247	0.650	0.101	1423.450	569.380	1496.741	233.492
51	**BPRTHS Driveway N End**	3,790	0.30	1137.0	20	0.02	3.580	0.240	0.610	0.095	1.065	0.247	0.622	0.097	1423.450	569.380	1430.551	223.166
52	**Hess Station opposite BPRTHS Driveway**	2,410	0.02	48.2	20	0.02	3.580	0.240	0.031	0.005	1.065	0.247	0.028	0.004	1423.450	569.380	62.605	9.766
53	**County 140 Erika to BPRTHS Driveway**	23,830	0.12	2859.6	40	0.02	3.580	0.181	1.193	0.186	1.065	0.229	1.459	0.228	1423.450	569.380	3610.356	563.216
54	**County 140 BPRTHS Driveway to Mozzone**	23,940	0.21	5027.4	40	0.02	3.580	0.181	2.059	0.321	1.065	0.229	2.554	0.398	1423.450	569.380	6331.636	987.735
55	**Mozzone Blvd**	5,740	0.21	1205.4	35	0.02	3.580	0.188	0.512	0.080	1.065	0.223	0.596	0.093	1423.450	569.380	1518.112	236.825
56	**County 140 Mozzone to 24 SB Ramp**	25,920	0.24	6220.8	40	0.02	3.580	0.181	2.539	0.396	1.065	0.229	3.158	0.493	1423.450	569.380	7831.407	1221.700
57	**County 140 SB ramp to NB Ramp**	39,220	0.17	6667.4	40	0.02	3.580	0.181	2.747	0.428	1.065	0.229	3.392	0.529	1423.450	569.380	8403.607	1310.963
58	**County 140 NB Ramp to Stevens St**	48,200	0.42	20244.0	40	0.02	3.580	0.181	8.184	1.277	1.065	0.229	10.252	1.599	1423.450	569.380	25453.796	3970.792
59	**24 SB off/on ramp**	25,380	0.21	5329.8	30	0.02	3.580	0.200	2.406	0.375	1.065	0.226	2.672	0.417	1423.450	569.380	6712.487	1047.148
60	**24 NB off/on ramp**	19,240	0.22	4232.8	30	0.02	3.580	0.200	1.909	0.298	1.065	0.226	2.122	0.331	1423.450	569.380	5330.098	831.495
61	**Poole St**	5,200	0.17	884.0	35	0.02	3.580	0.188	0.378	0.059	1.065	0.223	0.438	0.068	1423.450	569.380	1114.196	173.815
62	**Middleboro Poole to Stevens**	10,990	0.47	5165.3	35	0.02	3.580	0.188	2.165	0.338	1.065	0.223	2.547	0.397	1423.450	569.380	6493.450	1012.978
63	**Stevens Middleboro to Pinehill**	3,610	0.27	974.7	35	0.02	3.580	0.188	0.412	0.064	1.065	0.223	0.482	0.075	1423.450	569.380	1226.663	191.359
64	**Secondary Site Driveway**	1,140	0.25	285.0	20	0.02	3.580	0.240	0.153	0.024	1.065	0.247	0.156	0.024	1423.450	569.380	358.747	55.965
65	**Stevens Pinehill to O'Connell**	9,110	0.60	5466.0	35	0.02	3.580	0.188	2.285	0.357	1.065	0.223	2.693	0.420	1423.450	569.380	6869.272	1071.606
66	**O'Connell W of Stevens**	12,070	0.46	5552.2	35	0.02	3.580	0.188	2.328	0.363	1.065	0.223	2.738	0.427	1423.450	569.380	6980.057	1088.889
67	**Cotley St**	4,410	0.40	1764.0	35	0.02	3.580	0.188	0.741	0.116	1.065	0.223	0.870	0.136	1423.450	569.380	2218.149	346.031
68	**Middleboro Stevens to Pinehill**	7,550	0.32	2416.0	35	0.02	3.580	0.188	1.018	0.159	1.065	0.223	1.193	0.186	1423.450	569.380	3039.325	474.135
69	**Caswell St**	5,210	0.16	833.6	35	0.02	3.580	0.188	0.357	0.056	1.065	0.223	0.413	0.064	1423.450	569.380	1050.939	163.946
70	**Pinehill Stevens to Middleboro**	5,080	0.27	1371.6	35	0.02	3.580	0.188	0.580	0.090	1.065	0.223	0.678	0.106	1423.450	569.380	1726.163	269.281
71	**Middleboro Caswell to Liberty**	9,620	0.60	5772.0	35	0.02	3.580	0.188	2.413	0.376	1.065	0.223	2.844	0.444	1423.450	569.380	7253.831	1131.598
72	**Middleboro E of Liberty**	4,880	0.19	927.2	35	0.02	3.580	0.188	0.395	0.062	1.065	0.223	0.459	0.072	1423.450	569.380	1168.145	182.231

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2022 Alternative B

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
73	Liberty S of Middleboro	3,700	0.68	2516.0	35	0.02	3.580	0.188	1.051	0.164	1.065	0.223	1.239	0.193	1423.450	569.380	3161.496	493.193
74	Old Colony Ave N of Middleboro	9,570	0.19	1818.3	35	0.02	3.580	0.188	0.775	0.121	1.065	0.223	0.900	0.140	1423.450	569.380	2290.808	357.366
75	Stevens S of O'Connell	21,230	0.13	2759.9	35	0.02	3.580	0.188	1.190	0.186	1.065	0.223	1.371	0.214	1423.450	569.380	3482.939	543.338
76	New Ramp	0	0.10	0.0	30	0.02	3.580	0.200	0.000	0.000	1.065	0.226	0.000	0.000	1423.450	569.380	0.000	0.000
77	Stevens Street Connector	19,230	0.24	4615.2	30	0.02	3.580	0.200	2.077	0.324	1.065	0.226	2.312	0.361	1423.450	569.380	5810.106	906.377
78	Galleria Mall Drive N	6,170	0.20	1234.0	35	0.02	3.580	0.188	0.525	0.082	1.065	0.223	0.611	0.095	1423.450	569.380	1554.387	242.484
79	Galleria Mall Drive S	6,940	0.23	1596.2	35	0.02	3.580	0.188	0.677	0.106	1.065	0.223	0.789	0.123	1423.450	569.380	2009.719	313.516
80	Galleria Mall Drive	11,880	0.07	831.6	35	0.02	3.580	0.188	0.371	0.058	1.065	0.223	0.417	0.065	1423.450	569.380	1054.242	164.462
81	140 NB Ramp to Stevens St Ext	2,460	0.23	565.8	30	0.02	3.580	0.200	0.255	0.040	1.065	0.226	0.284	0.044	1423.450	569.380	712.379	111.131
82	Steven St Ext Ramp to 140 NB	11,550	0.21	2425.5	30	0.02	3.580	0.200	1.095	0.171	1.065	0.226	1.216	0.190	1423.450	569.380	3054.737	476.539
83	140 SB Ramp to Stevens St Connector	5,780	0.15	867.0	30	0.02	3.580	0.200	0.395	0.062	1.065	0.226	0.436	0.068	1423.450	569.380	1093.362	170.564
84	Galleria Mall Dr Ramp to 140 SB	3,980	0.17	676.6	30	0.02	3.580	0.200	0.307	0.048	1.065	0.226	0.340	0.053	1423.450	569.380	852.788	133.035
85	Stevens St Mall Connector Overpass WB	1,860	0.20	372.0	30	0.02	3.580	0.200	0.168	0.026	1.065	0.226	0.187	0.029	1423.450	569.380	468.584	73.099
86	Stevens St Mall Connector Overpass EB	1,940	0.20	388.0	30	0.02	3.580	0.200	0.175	0.027	1.065	0.226	0.195	0.030	1423.450	569.380	488.738	76.243
87	Myricks St 79 S of 140	7,990	0.30	2397.0	40	0.02	3.580	0.181	0.974	0.152	1.065	0.229	1.215	0.190	1423.450	569.380	3015.858	470.474
88	Myricks St 79 N of 140	11,590	0.30	3477.0	40	0.02	3.580	0.181	1.413	0.220	1.065	0.229	1.763	0.275	1423.450	569.380	4374.693	682.452
89	Myricks St 79 under 140	9,820	0.12	1178.4	40	0.02	3.580	0.181	0.492	0.077	1.065	0.229	0.601	0.094	1423.450	569.380	1487.776	232.093
90	140 SB Ramp to Myricks St 79	3,760	0.21	789.6	30	0.02	3.580	0.200	0.356	0.056	1.065	0.226	0.396	0.062	1423.450	569.380	994.442	155.133
91	Myricks St 79 Ramp to 140 SB	1,630	0.24	391.2	30	0.02	3.580	0.200	0.176	0.027	1.065	0.226	0.196	0.031	1423.450	569.380	492.484	76.828
92	140 NB Ramp to Myricks St 79	1,550	0.17	263.5	30	0.02	3.580	0.200	0.120	0.019	1.065	0.226	0.132	0.021	1423.450	569.380	332.116	51.810
93	Myricks St 79 Ramp to 140 NB	3,840	0.19	729.6	30	0.02	3.580	0.200	0.330	0.051	1.065	0.226	0.366	0.057	1423.450	569.380	919.196	143.395
94	Rte 44 West of Orchard	37,540	0.25	9385.0	40	0.02	3.580	0.181	3.827	0.597	1.065	0.229	4.763	0.743	1423.450	569.380	11813.476	1842.902
95	Orchard N of 44	8,180	0.25	2045.0	35	0.02	3.580	0.188	0.866	0.135	1.065	0.223	1.011	0.158	1423.450	569.380	2574.167	401.570
96	Orchard S of 44	10,560	0.25	2640.0	35	0.02	3.580	0.188	1.117	0.174	1.065	0.223	1.305	0.204	1423.450	569.380	3323.130	518.408
97	Rte 44 Orchard to Hill	30,980	1.25	38725.0	40	0.02	3.580	0.181	15.521	2.421	1.065	0.229	19.571	3.053	1423.450	569.380	48637.514	7587.452
98	Hill N of 44	1,300	0.25	325.0	35	0.02	3.580	0.188	0.138	0.021	1.065	0.223	0.161	0.025	1423.450	569.380	409.097	63.819
99	Hill S of 44	1,480	0.25	370.0	35	0.02	3.580	0.188	0.157	0.024	1.065	0.223	0.183	0.029	1423.450	569.380	465.742	72.656
100	Rte 44 Hill to Church	22,820	0.46	10497.2	40	0.02	3.580	0.181	4.239	0.661	1.065	0.229	5.315	0.829	1423.450	569.380	13196.761	2058.695
101	Church N of 44	2,620	0.25	655.0	35	0.02	3.580	0.188	0.277	0.043	1.065	0.223	0.324	0.051	1423.450	569.380	824.489	128.620
102	Church S of 44	3,340	0.25	835.0	35	0.02	3.580	0.188	0.353	0.055	1.065	0.223	0.413	0.064	1423.450	569.380	1051.066	163.966
103	Rte 44 Church to Richmond	22,520	0.88	19817.6	40	0.02	3.580	0.181	7.957	1.241	1.065	0.229	10.020	1.563	1423.450	569.380	24896.161	3883.801
104	Richmond N of 44	2,470	0.25	617.5	35	0.02	3.580	0.188	0.261	0.041	1.065	0.223	0.305	0.048	1423.450	569.380	777.285	121.256
105	Richmond S of 44	940	0.25	235.0	35	0.02	3.580	0.188	0.099	0.016	1.065	0.223	0.116	0.018	1423.450	569.380	295.809	46.146
106	Rte 44 Richmond to 495 SB ramps	19,930	1.18	23517.4	40	0.02	3.580	0.181	9.428	1.471	1.065	0.229	11.886	1.854	1423.450	569.380	29538.168	4607.954
107	495 SB Ramps (off) to Rte 44	6,660	0.25	1665.0	30	0.02	3.580	0.200	0.749	0.117	1.065	0.226	0.834	0.130	1423.450	569.380	2095.838	326.951
108	495 SB Ramps (on) from Rte 44	3,790	0.25	947.5	30	0.02	3.580	0.200	0.426	0.066	1.065	0.226	0.475	0.074	1423.450	569.380	1192.676	186.058
109	Rte 44 SB Ramps to NB Ramps	22,040	0.17	3746.8	40	0.02	3.580	0.181	1.543	0.241	1.065	0.229	1.906	0.297	1423.450	569.380	4722.475	736.706
110	495 NB Ramps (off) to Rte 44	3,090	0.25	772.5	30	0.02	3.580	0.200	0.347	0.054	1.065	0.226	0.387	0.060	1423.450	569.380	972.393	151.693
111	495 NB Ramps (on) from Rte 44	6,930	0.25	1732.5	30	0.02	3.580	0.200	0.779	0.122	1.065	0.226	0.868	0.135	1423.450	569.380	2180.804	340.205
112	Rte 44 NB Ramps to Rotary	25,160	0.17	4277.2	40	0.02	3.580	0.181	1.762	0.275	1.065	0.229	2.176	0.339	1423.450	569.380	5390.993	840.995
113	Bedford 28/18 N of Rotary	14,810	0.25	3702.5	40	0.02	3.580	0.181	1.510	0.236	1.065	0.229	1.879	0.293	1423.450	569.380	4660.564	727.048
114	Rte 44 E of Rotary	20,350	0.25	5087.5	40	0.02	3.580	0.181	2.075	0.324	1.065	0.229	2.582	0.403	1423.450	569.380	6403.949	999.016
115	W. Grove 28 SE of Rotary	15,080	0.25	3770.0	40	0.02	3.580	0.181	1.537	0.240	1.065	0.229	1.913	0.298	1423.450	569.380	4745.531	740.303
116	Bedford 18 S of Rotary to 495 NB Ramps	11,560	0.17	1965.2	40	0.02	3.580	0.181	0.810	0.126	1.065	0.229	1.000	0.156	1423.450	569.380	2476.943	386.403
117	Bedford 18 S of Rotary NB to SB ramps	13,190	0.19	2506.1	40	0.02	3.580	0.181	1.029	0.161	1.065	0.229	1.274	0.199	1423.450	569.380	3157.342	492.545
118	495 NB Ramps (off) to Rte 18	2,950	0.28	826.0	30	0.02	3.580	0.200	0.371	0.058	1.065	0.226	0.413	0.065	1423.450	569.380	1039.428	162.151
119	495 NB Ramps (on) from Rte 18	2,940	0.28	823.2	30	0.02	3.580	0.200	0.369	0.058	1.065	0.226	0.412	0.064	1423.450	569.380	1035.905	161.601
120	495 SB Ramps (off) to Rte 18	7,200	0.28	2016.0	30	0.02	3.580	0.200	0.905	0.141	1.065	0.226	1.009	0.157	1423.450	569.380	2536.910	395.758
121	495 SB Ramps (on) from Rte 18	2,010	0.28	562.8	30	0.02	3.580	0.200	0.253	0.039	1.065	0.226	0.282	0.044	1423.450	569.380	708.221	110.482
122	Bedford 495 SB Ramps to Taunton St	14,130	0.46	6499.8	40	0.02	3.580	0.181	2.625	0.409	1.065	0.229	3.291	0.513	1423.450	569.380	8171.351	1274.731
123	Taunton St E of Rte 18	520	0.25	130.0	35	0.02	3.580	0.188	0.055	0.009	1.065	0.223	0.064	0.010	1423.450	569.380	163.639	25.528
124	Taunton St W of Rte 18	2,660	25.00	66500.0	35	0.02	3.580	0.188	27.568	4.301	1.065	0.223	32.695	5.100	1423.450	569.380	83478.079	13022.580
125	Bedford 18 S of Taunton St.	10,560	0.25	2640.0	40	0.02	3.580	0.181	1.077	0.168	1.065	0.229	1.340	0.209	1423.450	569.380	3323.130	518.408
126	Rte 138 N of 495	23,710	0.25	5927.5	40	0.02	3.580	0.181	2.417	0.377	1.065	0.229	3.008	0.469	1423.450	569.380	7461.309	1163.964
127	Rte 138 ramp to 495 NB	5,730	0.27	1547.1	30	0.02	3.580	0.200	0.695	0.108	1.065	0.226	0.775	0.121	1423.450	569.380	1947.030	303.737
128	495 NB ramp to Rte 138	3,350	0.27	904.5	30	0.02	3.580	0.200	0.406	0.063	1.065	0.226	0.453	0.071	1423.450	569.380	1138.316	177.577
129	Rte 138 NB Ramps to SB ramps	24,450	0.15	3667.5	40	0.02	3.580	0.181	1.517	0.237	1.065	0.229	1.868	0.291	1423.450	569.380	4625.033	721.505
130	Rte 138 ramp to 495 SB	3,560	0.27	961.2	30	0.02	3.580	0.200	0.432	0.067	1.065	0.226	0.481	0.075	1423.450	569.380	1209.673	188.709
131	495 SB ramp to 138	7,380	0.27	1992.6	30	0.02	3.580	0.200	0.895	0.140	1.065	0.226	0.998	0.156	1423.450	569.380	2507.693	391.200
132	Rte 138 S of 495	25,970	0.25	6492.5	40	0.02	3.580	0.181	2.648	0.413	1.065	0.229	3.295	0.514	1423.450	569.380	8172.509	1274.911
133	Padelford St N of 24 SB Ramps	8,310	0.25	2077.5	35	0.02	3.580	0.188	0.879	0.137	1.065	0.223	1.027	0.160	1423.450	569.380	2615.077	407.952
134	Rte 24 SB Ramp to Padelford St	4,590	0.20	918.0	30	0.02	3.580	0.200	0.415	0.065	1.065	0.226	0.460	0.072	1423.450	569.380	1156.343	180.390
135	Rte 24 SB Ramp from Padelford St	860	0.20	172.0	30	0.02	3.580	0.200	0.078	0.012	1.065	0.226	0.086	0.013	1423.450	569.380	216.657	33.798
136	Padelford St SB Ramps to NB Ramps	5,550	0.29	1609.5	35	0.02	3.580	0.188	0.679	0.106	1.065	0.223	0.795	0.124	1423.450	569.380	2025.202	315.932
137	Rte 24 NB Ramp to Padelford St	780	0.20	156.0	30	0.02	3.580	0.200	0.070	0.011	1.065	0.226	0.078	0.012	1423.450	569.380	196.503	30.654
138	Rte 24 NB Ramp from Padelford St	4,700	0.20	940.0	30	0.02	3.580	0.200	0.425	0.066	1.065	0.226	0.471	0.074	1423.450	569.380	1184.055	184.713
139	Padelford St S of 24 NB Ramps	4,030	0.25	1007.5	35	0.02	3.580	0.188	0.426	0.067	1.065	0.223	0.498	0.078	1423.450	569.380	1268.202	197.840
140	Bedford St Rte 18 N of Rte 79	11,250	0.25	2812.5	40	0.02	3.580	0.181	1.147	0.179	1.065	0.229	1.427	0.223	1423.450	569.380	3540.267	552.282
141	Bedford St Rte 18 S of Rte 79	7,810	0.25	1952.5	40	0.02	3.580	0.181	0.796	0.124	1.065	0.229	0.991	0.155	1423.450	569.380	2457.732	383.406
142	RI Rd Rte 79 W of Rte 18	9,700	0.25	2425.0	40	0.02	3.580	0.181	0.989	0.154	1.065	0.229	1.231	0.192	1423.450	569.380	3052.497	476.189
143	RI Rd Rte 79 E of Rte 18	7,480	0.25	1870.0	40	0.02	3.580	0.181	0.763	0.119	1.065	0.229	0.949	0.148	1423.450	569.380	2353.884	367.206
144	Rte 104 Pleasant St W of Rte 24 SB Ramps	11,820	0.25	2955.0	40	0.02	3.580	0.181	1.205	0.188	1.065	0.229	1.500	0.234	1423.450	569.380	3719.640	580.264

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
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	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
145	**Rte 24 SB Ramp to Rte 104**	7,470	0.28	2091.6	30	0.02	3.580	0.200	0.939	0.146	1.065	0.226	1.047	0.163	1423.450	569.380	2632.044	410.599
146	**Rte 24 SB Ramp from Rte 104**	8,040	0.28	2251.2	30	0.02	3.580	0.200	1.010	0.158	1.065	0.226	1.127	0.176	1423.450	569.380	2832.883	441.930
147	**Rte 104 SB ramps to NB Ramps**	19,040	0.23	4379.2	40	0.02	3.580	0.181	1.789	0.279	1.065	0.229	2.223	0.347	1423.450	569.380	5513.696	860.137
148	**Rte 24 NB ramp to Rte 104**	7,670	0.28	2147.6	30	0.02	3.580	0.200	0.964	0.150	1.065	0.226	1.075	0.168	1423.450	569.380	2702.514	421.592
149	**Rte 24 NB ramp from Rte 104**	5,580	0.28	1562.4	30	0.02	3.580	0.200	0.701	0.109	1.065	0.226	0.782	0.122	1423.450	569.380	1966.105	306.712
150	**Rte 104 Pleasant St E of Rte 24 NB Ramps**	26,560	0.25	6640.0	40	0.02	3.580	0.181	2.708	0.422	1.065	0.229	3.370	0.526	1423.450	569.380	8358.176	1303.875
151	**Rte 105 S of Rte 495 SB Ramps**	16,520	0.25	4130.0	40	0.02	3.580	0.181	1.684	0.263	1.065	0.229	2.096	0.327	1423.450	569.380	5198.685	810.995
152	**Rte 495 SB Ramp to Rte 105**	5,110	0.20	1022.0	30	0.02	3.580	0.200	0.462	0.072	1.065	0.226	0.513	0.080	1423.450	569.380	1287.345	200.826
153	**Rte 495 SB Ramp from Rte 105**	2,380	0.20	476.0	30	0.02	3.580	0.200	0.215	0.034	1.065	0.226	0.239	0.037	1423.450	569.380	599.585	93.535
154	**Rte 105 SB ramps to NB Ramps**	17,420	0.23	4006.6	40	0.02	3.580	0.181	1.637	0.255	1.065	0.229	2.034	0.317	1423.450	569.380	5044.568	786.953
155	**Rte 495 NB Ramp to Rte 105**	2,240	0.20	448.0	30	0.02	3.580	0.200	0.202	0.032	1.065	0.226	0.225	0.035	1423.450	569.380	564.316	88.033
156	**Rte 495 NB Ramp from Rte 105**	6,530	0.20	1306.0	30	0.02	3.580	0.200	0.590	0.092	1.065	0.226	0.655	0.102	1423.450	569.380	1645.081	256.633
157	**Rte 105 N of Rte 495 NB Ramps**	18,610	0.25	4652.5	40	0.02	3.580	0.181	1.897	0.296	1.065	0.229	2.361	0.368	1423.450	569.380	5856.388	913.596
	Total	1654060.000	67.190	561284.600					232.825	36.321			281.882	43.974			706008.169	110137.274

Notes: Daily to annual factor (6 days/week * 52 weeks per year / 365 days per year) = 85%

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2022 Alt B with Mitigation

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
1	**Bay St**	5,650	0.27	1525.5	35	0.02	3.580	0.188	0.645	0.101	1.065	0.223	0.754	0.118	1423.450	569.380	1919.847	299.496
2	**Broadway 138 N of Bay St**	12,790	0.33	4220.7	40	0.02	3.580	0.181	1.712	0.267	1.065	0.229	2.139	0.334	1423.450	569.380	5309.287	828.249
3	**Exeter St**	340	0.11	37.4	35	0.02	3.580	0.188	0.016	0.003	1.065	0.223	0.019	0.003	1423.450	569.380	47.244	7.370
4	**Broadway 138 Exeter to Washington**	17,600	0.41	7216.0	40	0.02	3.580	0.181	2.918	0.455	1.065	0.229	3.655	0.570	1423.450	569.380	9073.404	1415.451
5	**Washington E of Broadway**	4,320	0.17	734.4	35	0.02	3.580	0.188	0.314	0.049	1.065	0.223	0.364	0.057	1423.450	569.380	925.639	144.400
6	**Washington Court to Broadway**	10,280	0.31	3186.8	35	0.02	3.580	0.188	1.343	0.210	1.065	0.223	1.573	0.245	1423.450	569.380	4009.270	625.446
7	**Broadway 138 Washington to Court**	11,510	0.29	3337.9	40	0.02	3.580	0.181	1.357	0.212	1.065	0.229	1.693	0.264	1423.450	569.380	4200.015	655.202
8	**Washington Court to Martin**	19,830	0.05	991.5	35	0.02	3.580	0.188	0.454	0.071	1.065	0.223	0.500	0.078	1423.450	569.380	1261.891	196.855
9	**Washington Martin to Tremont**	18,850	0.10	1885.0	40	0.02	3.580	0.181	0.794	0.124	1.065	0.229	0.964	0.150	1423.450	569.380	2382.624	371.689
10	**Washington/Oak S of Tremont**	9,800	0.15	1470.0	35	0.02	3.580	0.188	0.631	0.098	1.065	0.223	0.729	0.114	1423.450	569.380	1853.796	289.192
11	**Tremont W of Washington**	15,770	0.15	2365.5	40	0.02	3.580	0.181	0.979	0.153	1.065	0.229	1.205	0.188	1423.450	569.380	2983.099	465.363
12	**Martin Washington to Cohannet**	8,420	0.19	1599.8	35	0.02	3.580	0.188	0.682	0.106	1.065	0.223	0.792	0.124	1423.450	569.380	2015.528	314.422
13	**Court Washington to PO Square**	7,340	0.20	1468.0	35	0.02	3.580	0.188	0.625	0.097	1.065	0.223	0.727	0.113	1423.450	569.380	1849.142	288.466
14	**PO Square**	2,870	0.07	200.9	35	0.02	3.580	0.188	0.090	0.014	1.065	0.223	0.101	0.016	1423.450	569.380	254.686	39.731
15	**Court PO Square to Broadway**	15,700	0.05	785.0	35	0.02	3.580	0.188	0.360	0.056	1.065	0.223	0.396	0.062	1423.450	569.380	999.077	155.856
16	**Cohannet PO Square to Martin**	6,430	0.08	514.4	35	0.02	3.580	0.188	0.227	0.035	1.065	0.223	0.257	0.040	1423.450	569.380	651.318	101.606
17	**Cohannet Martin to High**	10,210	0.05	510.5	35	0.02	3.580	0.188	0.234	0.036	1.065	0.223	0.258	0.040	1423.450	569.380	649.718	101.356
18	**High W of 44**	10,710	0.11	1178.1	35	0.02	3.580	0.188	0.512	0.080	1.065	0.223	0.586	0.091	1423.450	569.380	1488.175	232.155
19	**High E of 44**	8,890	0.22	1955.8	35	0.02	3.580	0.188	0.830	0.129	1.065	0.223	0.967	0.151	1423.450	569.380	2462.816	384.199
20	**Winthrop 44 High to Highland**	13,110	1.19	15600.9	40	0.02	3.580	0.181	6.254	0.976	1.065	0.229	7.885	1.230	1423.450	569.380	19594.842	3056.795
21	**Highland W of 44**	4,880	0.25	1220.0	35	0.02	3.580	0.188	0.516	0.081	1.065	0.223	0.603	0.094	1423.450	569.380	1535.689	239.567
22	**Highland E of 44**	4,670	0.25	1167.5	35	0.02	3.580	0.188	0.494	0.077	1.065	0.223	0.577	0.090	1423.450	569.380	1469.604	229.258
23	**Winthrop 44 S of Highland**	16,220	0.25	4055.0	40	0.02	3.580	0.181	1.654	0.258	1.065	0.229	2.058	0.321	1423.450	569.380	5104.278	796.267
24	**Winthrop 44 High to Main**	8,890	0.19	1689.1	40	0.02	3.580	0.181	0.694	0.108	1.065	0.229	0.859	0.134	1423.450	569.380	2128.034	331.973
25	**Weir 138 S of 44**	8,660	0.25	2165.0	35	0.02	3.580	0.188	0.916	0.143	1.065	0.223	1.070	0.167	1423.450	569.380	2725.219	425.134
26	**Broadway 138 Court to 44**	16,120	0.06	967.2	35	0.02	3.580	0.188	0.436	0.068	1.065	0.223	0.486	0.076	1423.450	569.380	1228.154	191.592
27	**Cohannet PO Square to Broadway**	14,390	0.09	1295.1	30	0.02	3.580	0.200	0.603	0.094	1.065	0.226	0.655	0.102	1423.450	569.380	1638.250	255.567
28	**Main St Broadway to Summer**	20,000	0.19	3800.0	35	0.02	3.580	0.188	1.619	0.253	1.065	0.223	1.881	0.293	1423.450	569.380	4787.478	746.847
29	**Union St**	540	0.13	70.2	35	0.02	3.580	0.188	0.030	0.005	1.065	0.223	0.035	0.005	1423.450	569.380	88.591	13.820
30	**Summer St 140 Main to Ingell**	9,050	0.52	4706.0	40	0.02	3.580	0.181	1.898	0.296	1.065	0.229	2.382	0.372	1423.450	569.380	5915.211	922.773
31	**Ingell S of Summer 140**	8,700	0.25	2175.0	35	0.02	3.580	0.188	0.921	0.144	1.065	0.223	1.075	0.168	1423.450	569.380	2737.806	427.098
32	**County 140 Ingell to Williams**	16,430	0.33	5421.9	40	0.02	3.580	0.181	2.200	0.343	1.065	0.229	2.748	0.429	1423.450	569.380	6820.296	1063.966
33	**44 Union to Longmeadow-Owen**	17,110	0.72	12319.2	40	0.02	3.580	0.181	4.953	0.773	1.065	0.229	6.231	0.972	1423.450	569.380	15478.894	2414.707
34	**Longmeadow**	11,060	0.50	5530.0	35	0.02	3.580	0.188	2.316	0.361	1.065	0.223	2.726	0.425	1423.450	569.380	6951.310	1084.404
35	**Dean 44 E of Longmeadow-Owen**	29,070	0.15	4360.5	40	0.02	3.580	0.181	1.804	0.281	1.065	0.229	2.220	0.346	1423.450	569.380	5498.966	857.839
36	**Owen Dean to Williams**	14,150	0.55	7782.5	35	0.02	3.580	0.188	3.257	0.508	1.065	0.223	3.835	0.598	1423.450	569.380	9781.509	1525.915
37	**Williams N of Owen**	7,390	0.17	1256.3	35	0.02	3.580	0.188	0.537	0.084	1.065	0.223	0.622	0.097	1423.450	569.380	1583.443	247.017
38	**Williams Owen to 140**	3,760	0.14	526.4	35	0.02	3.580	0.188	0.226	0.035	1.065	0.223	0.261	0.041	1423.450	569.380	664.054	103.592
39	**Riverway Ext**	8,710	0.18	1567.8	35	0.02	3.580	0.188	0.669	0.104	1.065	0.223	0.776	0.121	1423.450	569.380	1975.612	308.195
40	**County 140 Williams to Riverway**	12,680	0.12	1521.6	40	0.02	3.580	0.181	0.635	0.099	1.065	0.229	0.776	0.121	1423.450	569.380	1921.079	299.688
41	**County 140 Riverway to Johnson**	20,300	0.52	10556.0	40	0.02	3.580	0.181	4.257	0.664	1.065	0.229	5.343	0.833	1423.450	569.380	13268.374	2069.866
42	**Johnson N of 140**	160	0.47	75.2	35	0.02	3.580	0.188	0.032	0.005	1.065	0.223	0.037	0.006	1423.450	569.380	94.536	14.748
43	**Johnson S of 140**	660	0.26	171.6	35	0.02	3.580	0.188	0.073	0.011	1.065	0.223	0.085	0.013	1423.450	569.380	215.980	33.693
44	**Trucchis Driveway**	1,610	0.04	64.4	20	0.02	3.580	0.240	0.038	0.006	1.065	0.247	0.036	0.006	1423.450	569.380	82.243	12.830
45	**County 140 Johnson to Hart**	19,920	0.27	5378.4	40	0.02	3.580	0.181	2.190	0.342	1.065	0.229	2.728	0.426	1423.450	569.380	6768.733	1055.922
46	**Hart W of 140**	9,830	0.15	1474.5	35	0.02	3.580	0.188	0.633	0.099	1.065	0.223	0.731	0.114	1423.450	569.380	1859.471	290.078
47	**Hart 140 to Poole**	8,710	0.73	6358.3	35	0.02	3.580	0.188	2.654	0.414	1.065	0.223	3.132	0.489	1423.450	569.380	7989.005	1246.285
48	**County 140 Hart to Erika**	24,280	0.41	9954.8	40	0.02	3.580	0.181	4.026	0.628	1.065	0.229	5.042	0.786	1423.450	569.380	12517.173	1952.679
49	**Erika Drive**	14,770	0.14	2067.8	35	0.02	3.580	0.188	0.889	0.139	1.065	0.223	1.026	0.160	1423.450	569.380	2608.532	406.931
50	**BPRTHS Driveway S End**	3,400	0.35	1190.0	20	0.02	3.580	0.240	0.637	0.099	1.065	0.247	0.650	0.101	1423.450	569.380	1496.741	233.492
51	**BPRTHS Driveway N End**	3,790	0.30	1137.0	20	0.02	3.580	0.240	0.610	0.095	1.065	0.247	0.622	0.097	1423.450	569.380	1430.551	223.166
52	**Hess Station opposite BPRTHS Driveway**	2,410	0.02	48.2	20	0.02	3.580	0.240	0.031	0.005	1.065	0.247	0.028	0.004	1423.450	569.380	62.605	9.766
53	**County 140 Erika to BPRTHS Driveway**	23,830	0.12	2859.6	40	0.02	3.580	0.181	1.193	0.186	1.065	0.229	1.459	0.228	1423.450	569.380	3610.356	563.216
54	**County 140 BPRTHS Driveway to Mozzone**	23,940	0.21	5027.4	40	0.02	3.580	0.181	2.059	0.321	1.065	0.229	2.554	0.398	1423.450	569.380	6331.636	987.735
55	**Mozzone Blvd**	5,740	0.21	1205.4	35	0.02	3.580	0.188	0.512	0.080	1.065	0.223	0.596	0.093	1423.450	569.380	1518.112	236.825
56	**County 140 Mozzone to 24 SB Ramp**	25,920	0.24	6220.8	40	0.02	3.580	0.181	2.539	0.396	1.065	0.229	3.158	0.493	1423.450	569.380	7831.407	1221.700
57	**County 140 SB ramp to NB Ramp**	39,220	0.17	6667.4	40	0.02	3.580	0.181	2.747	0.428	1.065	0.229	3.392	0.529	1423.450	569.380	8403.607	1310.963
58	**County 140 NB Ramp to Stevens St**	48,200	0.42	20244.0	40	0.02	3.580	0.181	8.184	1.277	1.065	0.229	10.252	1.599	1423.450	569.380	25453.796	3970.792
59	**24 SB off/on ramp**	25,380	0.21	5329.8	30	0.02	3.580	0.200	2.406	0.375	1.065	0.226	2.672	0.417	1423.450	569.380	6712.487	1047.148
60	**24 NB off/on ramp**	19,240	0.22	4232.8	30	0.02	3.580	0.200	1.909	0.298	1.065	0.226	2.122	0.331	1423.450	569.380	5330.098	831.495
61	**Poole St**	5,200	0.17	884.0	35	0.02	3.580	0.188	0.378	0.059	1.065	0.223	0.438	0.068	1423.450	569.380	1114.196	173.815
62	**Middleboro Poole to Stevens**	10,990	0.47	5165.3	35	0.02	3.580	0.188	2.165	0.338	1.065	0.223	2.547	0.397	1423.450	569.380	6493.450	1012.978
63	**Stevens Middleboro to Pinehill**	3,610	0.27	974.7	35	0.02	3.580	0.188	0.412	0.064	1.065	0.223	0.482	0.075	1423.450	569.380	1226.663	191.359
64	**Secondary Site Driveway**	1,750	0.25	437.5	20	0.02	3.580	0.240	0.235	0.037	1.065	0.247	0.239	0.037	1423.450	569.380	550.708	85.910
65	**Stevens Pinehill to O'Connell**	9,110	0.60	5466.0	35	0.02	3.580	0.188	2.285	0.357	1.065	0.223	2.693	0.420	1423.450	569.380	6869.272	1071.606
66	**O'Connell W of Stevens**	11,460	0.46	5271.6	35	0.02	3.580	0.188	2.210	0.345	1.065	0.223	2.599	0.405	1423.450	569.380	6627.295	1033.858
67	**Cotley St**	4,410	0.40	1764.0	35	0.02	3.580	0.188	0.741	0.116	1.065	0.223	0.870	0.136	1423.450	569.380	2218.149	346.031
68	**Middleboro Stevens to Pinehill**	7,550	0.32	2416.0	35	0.02	3.580	0.188	1.018	0.159	1.065	0.223	1.193	0.186	1423.450	569.380	3039.325	474.135
69	**Caswell St**	5,210	0.16	833.6	35	0.02	3.580	0.188	0.357	0.056	1.065	0.223	0.413	0.064	1423.450	569.380	1050.939	163.946
70	**Pinehill Stevens to Middleboro**	5,080	0.27	1371.6	35	0.02	3.580	0.188	0.580	0.090	1.065	0.223	0.678	0.106	1423.450	569.380	1726.163	269.281
71	**Middleboro Caswell to Liberty**	9,620	0.60	5772.0	35	0.02	3.580	0.188	2.413	0.376	1.065	0.223	2.844	0.444	1423.450	569.380	7253.831	1131.598
72	**Middleboro E of Liberty**	4,880	0.19	927.2	35	0.02	3.580	0.188	0.395	0.062	1.065	0.223	0.459	0.072	1423.450	569.380	1168.145	182.231

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2022 Alt B with Mitigation

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
73	Liberty S of Middleboro	3,700	0.68	2516.0	35	0.02	3.580	0.188	1.051	0.164	1.065	0.223	1.239	0.193	1423.450	569.380	3161.496	493.193
74	Old Colony Ave N of Middleboro	9,570	0.19	1818.3	35	0.02	3.580	0.188	0.775	0.121	1.065	0.223	0.900	0.140	1423.450	569.380	2290.808	357.366
75	Stevens S of O'Connell	21,230	0.13	2759.9	35	0.02	3.580	0.188	1.190	0.186	1.065	0.223	1.371	0.214	1423.450	569.380	3482.939	543.338
76	New Ramp	0	0.10	0.0	30	0.02	3.580	0.200	0.000	0.000	1.065	0.226	0.000	0.000	1423.450	569.380	0.000	0.000
77	Stevens Street Connector	18,830	0.24	4519.2	30	0.02	3.580	0.200	2.034	0.317	1.065	0.226	2.264	0.353	1423.450	569.380	5689.251	887.523
78	Galleria Mall Drive N	6,170	0.20	1234.0	35	0.02	3.580	0.188	0.525	0.082	1.065	0.223	0.611	0.095	1423.450	569.380	1554.387	242.484
79	Galleria Mall Drive S	6,940	0.23	1596.2	35	0.02	3.580	0.188	0.677	0.106	1.065	0.223	0.789	0.123	1423.450	569.380	2009.719	313.516
80	Galleria Mall Drive	11,880	0.07	831.6	35	0.02	3.580	0.188	0.371	0.058	1.065	0.223	0.417	0.065	1423.450	569.380	1054.242	164.462
81	140 NB Ramp to Stevens St Ext	2,460	0.23	565.8	30	0.02	3.580	0.200	0.255	0.040	1.065	0.226	0.284	0.044	1423.450	569.380	712.379	111.131
82	Steven St Ext Ramp to 140 NB	11,550	0.21	2425.5	30	0.02	3.580	0.200	1.095	0.171	1.065	0.226	1.216	0.190	1423.450	569.380	3054.737	476.539
83	140 SB Ramp to Stevens St Connector	5,780	0.15	867.0	30	0.02	3.580	0.200	0.395	0.062	1.065	0.226	0.436	0.068	1423.450	569.380	1093.362	170.564
84	Galleria Mall Dr Ramp to 140 SB	3,980	0.17	676.6	30	0.02	3.580	0.200	0.307	0.048	1.065	0.226	0.340	0.053	1423.450	569.380	852.788	133.035
85	Stevens St Mall Connector Overpass WB	1,860	0.20	372.0	30	0.02	3.580	0.200	0.168	0.026	1.065	0.226	0.187	0.029	1423.450	569.380	468.584	73.099
86	Stevens St Mall Connector Overpass EB	1,940	0.20	388.0	30	0.02	3.580	0.200	0.175	0.027	1.065	0.226	0.195	0.030	1423.450	569.380	488.738	76.243
87	Myricks St 79 S of 140	7,990	0.30	2397.0	40	0.02	3.580	0.181	0.974	0.152	1.065	0.229	1.215	0.190	1423.450	569.380	3015.858	470.474
88	Myricks St 79 N of 140	11,590	0.30	3477.0	40	0.02	3.580	0.181	1.413	0.220	1.065	0.229	1.763	0.275	1423.450	569.380	4374.693	682.452
89	Myricks St 79 under 140	9,820	0.12	1178.4	40	0.02	3.580	0.181	0.492	0.077	1.065	0.229	0.601	0.094	1423.450	569.380	1487.776	232.093
90	140 SB Ramp to Myricks St 79	3,760	0.21	789.6	30	0.02	3.580	0.200	0.356	0.056	1.065	0.226	0.396	0.062	1423.450	569.380	994.442	155.133
91	Myricks St 79 Ramp to 140 SB	1,630	0.24	391.2	30	0.02	3.580	0.200	0.176	0.027	1.065	0.226	0.196	0.031	1423.450	569.380	492.484	76.828
92	140 NB Ramp to Myricks St 79	1,550	0.17	263.5	30	0.02	3.580	0.200	0.120	0.019	1.065	0.226	0.132	0.021	1423.450	569.380	332.116	51.810
93	Myricks St 79 Ramp to 140 NB	3,840	0.19	729.6	30	0.02	3.580	0.200	0.330	0.051	1.065	0.226	0.366	0.057	1423.450	569.380	919.196	143.395
94	Rte 44 West of Orchard	37,540	0.25	9385.0	40	0.02	3.580	0.181	3.827	0.597	1.065	0.229	4.763	0.743	1423.450	569.380	11813.476	1842.902
95	Orchard N of 44	8,180	0.25	2045.0	35	0.02	3.580	0.188	0.866	0.135	1.065	0.223	1.011	0.158	1423.450	569.380	2574.167	401.570
96	Orchard S of 44	10,560	0.25	2640.0	35	0.02	3.580	0.188	1.117	0.174	1.065	0.223	1.305	0.204	1423.450	569.380	3323.130	518.408
97	Rte 44 Orchard to Hill	30,980	1.25	38725.0	40	0.02	3.580	0.181	15.521	2.421	1.065	0.229	19.571	3.053	1423.450	569.380	48637.514	7587.452
98	Hill N of 44	1,300	0.25	325.0	35	0.02	3.580	0.188	0.138	0.021	1.065	0.223	0.161	0.025	1423.450	569.380	409.097	63.819
99	Hill S of 44	1,480	0.25	370.0	35	0.02	3.580	0.188	0.157	0.024	1.065	0.223	0.183	0.029	1423.450	569.380	465.742	72.656
100	Rte 44 Hill to Church	22,820	0.46	10497.2	40	0.02	3.580	0.181	4.239	0.661	1.065	0.229	5.315	0.829	1423.450	569.380	13196.761	2058.695
101	Church N of 44	2,620	0.25	655.0	35	0.02	3.580	0.188	0.277	0.043	1.065	0.223	0.324	0.051	1423.450	569.380	824.489	128.620
102	Church S of 44	3,340	0.25	835.0	35	0.02	3.580	0.188	0.353	0.055	1.065	0.223	0.413	0.064	1423.450	569.380	1051.066	163.966
103	Rte 44 Church to Richmond	22,520	0.88	19817.6	40	0.02	3.580	0.181	7.957	1.241	1.065	0.229	10.020	1.563	1423.450	569.380	24896.161	3883.801
104	Richmond N of 44	2,470	0.25	617.5	35	0.02	3.580	0.188	0.261	0.041	1.065	0.223	0.305	0.048	1423.450	569.380	777.285	121.256
105	Richmond S of 44	940	0.25	235.0	35	0.02	3.580	0.188	0.099	0.016	1.065	0.223	0.116	0.018	1423.450	569.380	295.809	46.146
106	Rte 44 Richmond to 495 SB ramps	19,930	1.18	23517.4	40	0.02	3.580	0.181	9.428	1.471	1.065	0.229	11.886	1.854	1423.450	569.380	29538.168	4607.954
107	495 SB Ramps (off) to Rte 44	6,660	0.25	1665.0	30	0.02	3.580	0.200	0.749	0.117	1.065	0.226	0.834	0.130	1423.450	569.380	2095.838	326.951
108	495 SB Ramps (on) from Rte 44	3,790	0.25	947.5	30	0.02	3.580	0.200	0.426	0.066	1.065	0.226	0.475	0.074	1423.450	569.380	1192.676	186.058
109	Rte 44 SB Ramps to NB Ramps	22,040	0.17	3746.8	40	0.02	3.580	0.181	1.543	0.241	1.065	0.229	1.906	0.297	1423.450	569.380	4722.475	736.706
110	495 NB Ramps (off) to Rte 44	3,090	0.25	772.5	30	0.02	3.580	0.200	0.347	0.054	1.065	0.226	0.387	0.060	1423.450	569.380	972.393	151.693
111	495 NB Ramps (on) from Rte 44	6,930	0.25	1732.5	30	0.02	3.580	0.200	0.779	0.122	1.065	0.226	0.868	0.135	1423.450	569.380	2180.804	340.205
112	Rte 44 NB Ramps to Rotary	25,160	0.17	4277.2	40	0.02	3.580	0.181	1.762	0.275	1.065	0.229	2.176	0.339	1423.450	569.380	5390.993	840.995
113	Bedford 28/18 N of Rotary	14,810	0.25	3702.5	40	0.02	3.580	0.181	1.510	0.236	1.065	0.229	1.879	0.293	1423.450	569.380	4660.564	727.048
114	Rte 44 E of Rotary	20,350	0.25	5087.5	40	0.02	3.580	0.181	2.075	0.324	1.065	0.229	2.582	0.403	1423.450	569.380	6403.949	999.016
115	W. Grove 28 SE of Rotary	15,080	0.25	3770.0	40	0.02	3.580	0.181	1.537	0.240	1.065	0.229	1.913	0.298	1423.450	569.380	4745.531	740.303
116	Bedford 18 S of Rotary to 495 NB Ramps	11,560	0.17	1965.2	40	0.02	3.580	0.181	0.810	0.126	1.065	0.229	1.000	0.156	1423.450	569.380	2476.943	386.403
117	Bedford 18 S of Rotary NB to SB ramps	13,190	0.19	2506.1	40	0.02	3.580	0.181	1.029	0.161	1.065	0.229	1.274	0.199	1423.450	569.380	3157.342	492.545
118	495 NB Ramps (off) to Rte 18	2,950	0.28	826.0	30	0.02	3.580	0.200	0.371	0.058	1.065	0.226	0.413	0.065	1423.450	569.380	1039.428	162.151
119	495 NB Ramps (on) from Rte 18	2,940	0.28	823.2	30	0.02	3.580	0.200	0.369	0.058	1.065	0.226	0.412	0.064	1423.450	569.380	1035.905	161.601
120	495 SB Ramps (off) to Rte 18	7,200	0.28	2016.0	30	0.02	3.580	0.200	0.905	0.141	1.065	0.226	1.009	0.157	1423.450	569.380	2536.910	395.758
121	495 SB Ramps (on) from Rte 18	2,010	0.28	562.8	30	0.02	3.580	0.200	0.253	0.039	1.065	0.226	0.282	0.044	1423.450	569.380	708.221	110.482
122	Bedford 495 SB Ramps to Taunton St	14,130	0.46	6499.8	40	0.02	3.580	0.181	2.625	0.409	1.065	0.229	3.291	0.513	1423.450	569.380	8171.351	1274.731
123	Taunton St E of Rte 18	520	0.25	130.0	35	0.02	3.580	0.188	0.055	0.009	1.065	0.223	0.064	0.010	1423.450	569.380	163.639	25.528
124	Taunton St W of Rte 18	2,660	25.00	66500.0	35	0.02	3.580	0.188	27.568	4.301	1.065	0.223	32.695	5.100	1423.450	569.380	83478.079	13022.580
125	Bedford 18 S of Taunton St.	10,560	0.25	2640.0	40	0.02	3.580	0.181	1.077	0.168	1.065	0.229	1.340	0.209	1423.450	569.380	3323.130	518.408
126	Rte 138 N of 495	23,710	0.25	5927.5	40	0.02	3.580	0.181	2.417	0.377	1.065	0.229	3.008	0.469	1423.450	569.380	7461.309	1163.964
127	Rte 138 ramp to 495 NB	5,730	0.27	1547.1	30	0.02	3.580	0.200	0.695	0.108	1.065	0.226	0.775	0.121	1423.450	569.380	1947.030	303.737
128	495 NB ramp to Rte 138	3,350	0.27	904.5	30	0.02	3.580	0.200	0.406	0.063	1.065	0.226	0.453	0.071	1423.450	569.380	1138.316	177.577
129	Rte 138 NB Ramps to SB ramps	24,450	0.15	3667.5	40	0.02	3.580	0.181	1.517	0.237	1.065	0.229	1.868	0.291	1423.450	569.380	4625.033	721.505
130	Rte 138 ramp to 495 SB	3,560	0.27	961.2	30	0.02	3.580	0.200	0.432	0.067	1.065	0.226	0.481	0.075	1423.450	569.380	1209.673	188.709
131	495 SB ramp to 138	7,380	0.27	1992.6	30	0.02	3.580	0.200	0.895	0.140	1.065	0.226	0.998	0.156	1423.450	569.380	2507.693	391.200
132	Rte 138 S of 495	25,970	0.25	6492.5	40	0.02	3.580	0.181	2.648	0.413	1.065	0.229	3.295	0.514	1423.450	569.380	8172.509	1274.911
133	Padelford St N of 24 SB Ramps	8,310	0.25	2077.5	35	0.02	3.580	0.188	0.879	0.137	1.065	0.223	1.027	0.160	1423.450	569.380	2615.077	407.952
134	Rte 24 SB Ramp to Padelford St	4,590	0.20	918.0	30	0.02	3.580	0.200	0.415	0.065	1.065	0.226	0.460	0.072	1423.450	569.380	1156.343	180.390
135	Rte 24 SB Ramp from Padelford St	860	0.20	172.0	30	0.02	3.580	0.200	0.078	0.012	1.065	0.226	0.086	0.013	1423.450	569.380	216.657	33.798
136	Padelford St SB Ramps to NB Ramps	5,550	0.29	1609.5	35	0.02	3.580	0.188	0.679	0.106	1.065	0.223	0.795	0.124	1423.450	569.380	2025.202	315.932
137	Rte 24 NB Ramp to Padelford St	780	0.20	156.0	30	0.02	3.580	0.200	0.070	0.011	1.065	0.226	0.078	0.012	1423.450	569.380	196.503	30.654
138	Rte 24 NB Ramp from Padelford St	4,700	0.20	940.0	30	0.02	3.580	0.200	0.425	0.066	1.065	0.226	0.471	0.074	1423.450	569.380	1184.055	184.713
139	Padelford St S of 24 NB Ramps	4,030	0.25	1007.5	35	0.02	3.580	0.188	0.426	0.067	1.065	0.223	0.498	0.078	1423.450	569.380	1268.202	197.840
140	Bedford St Rte 18 N of Rte 79	11,250	0.25	2812.5	40	0.02	3.580	0.181	1.147	0.179	1.065	0.229	1.427	0.223	1423.450	569.380	3540.267	552.282
141	Bedford St Rte 18 S of Rte 79	7,810	0.25	1952.5	40	0.02	3.580	0.181	0.796	0.124	1.065	0.229	0.991	0.155	1423.450	569.380	2457.732	383.406
142	RI Rd Rte 79 W of Rte 18	9,700	0.25	2425.0	40	0.02	3.580	0.181	0.989	0.154	1.065	0.229	1.231	0.192	1423.450	569.380	3052.497	476.189
143	RI Rd Rte 79 E of Rte 18	7,480	0.25	1870.0	40	0.02	3.580	0.181	0.763	0.119	1.065	0.229	0.949	0.148	1423.450	569.380	2353.884	367.206
144	Rte 104 Pleasant St W of Rte 24 SB Ramps	11,820	0.25	2955.0	40	0.02	3.580	0.181	1.205	0.188	1.065	0.229	1.500	0.234	1423.450	569.380	3719.640	580.264

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Regional Mesoscale Emissions Analysis - Roadway Emissions
2022 Alt B with Mitigation

	Link	Daily Average Volumes	Miles Per Link	Miles Traveled	Vehicle Speed (mph)	Avg Idle Time (hr/veh)	Idle M6.2 VOC (g/hr)	M6.2 VOC (g/mile)	lbs/day	tons/year	Idle M6.2 NOX (g/hr)	M6.2 NOX (g/mile)	lbs/day	tons/year	Idle M6.2 CO2 (g/hr)	M6.2 CO2 (g/mile)	lbs/day	tons/year
145	**Rte 24 SB Ramp to Rte 104**	7,470	0.28	2091.6	30	0.02	3.580	0.200	0.939	0.146	1.065	0.226	1.047	0.163	1423.450	569.380	2632.044	410.599
146	**Rte 24 SB Ramp from Rte 104**	8,040	0.28	2251.2	30	0.02	3.580	0.200	1.010	0.158	1.065	0.226	1.127	0.176	1423.450	569.380	2832.883	441.930
147	**Rte 104 SB ramps to NB Ramps**	19,040	0.23	4379.2	40	0.02	3.580	0.181	1.789	0.279	1.065	0.229	2.223	0.347	1423.450	569.380	5513.696	860.137
148	**Rte 24 NB ramp to Rte 104**	7,670	0.28	2147.6	30	0.02	3.580	0.200	0.964	0.150	1.065	0.226	1.075	0.168	1423.450	569.380	2702.514	421.592
149	**Rte 24 NB ramp from Rte 104**	5,580	0.28	1562.4	30	0.02	3.580	0.200	0.701	0.109	1.065	0.226	0.782	0.122	1423.450	569.380	1966.105	306.712
150	**Rte 104 Pleasant St E of Rte 24 NB Ramps**	26,560	0.25	6640.0	40	0.02	3.580	0.181	2.708	0.422	1.065	0.229	3.370	0.526	1423.450	569.380	8358.176	1303.875
151	**Rte 105 S of Rte 495 SB Ramps**	16,520	0.25	4130.0	40	0.02	3.580	0.181	1.684	0.263	1.065	0.229	2.096	0.327	1423.450	569.380	5198.685	810.995
152	**Rte 495 SB Ramp to Rte 105**	5,110	0.20	1022.0	30	0.02	3.580	0.200	0.462	0.072	1.065	0.226	0.513	0.080	1423.450	569.380	1287.345	200.826
153	**Rte 495 SB Ramp from Rte 105**	2,380	0.20	476.0	30	0.02	3.580	0.200	0.215	0.034	1.065	0.226	0.239	0.037	1423.450	569.380	599.585	93.535
154	**Rte 105 SB ramps to NB Ramps**	17,420	0.23	4006.6	40	0.02	3.580	0.181	1.637	0.255	1.065	0.229	2.034	0.317	1423.450	569.380	5044.568	786.953
155	**Rte 495 NB Ramp to Rte 105**	2,240	0.20	448.0	30	0.02	3.580	0.200	0.202	0.032	1.065	0.226	0.225	0.035	1423.450	569.380	564.316	88.033
156	**Rte 495 NB Ramp from Rte 105**	6,530	0.20	1306.0	30	0.02	3.580	0.200	0.590	0.092	1.065	0.226	0.655	0.102	1423.450	569.380	1645.081	256.633
157	**Rte 105 N of Rte 495 NB Ramps**	18,610	0.25	4652.5	40	0.02	3.580	0.181	1.897	0.296	1.065	0.229	2.361	0.368	1423.450	569.380	5856.388	913.596
	Total	1653660.000	67.190	561060.500					232.747	36.308			281.779	43.958			705726.513	110093.336

Notes: Daily to annual factor (6 days/week * 52 weeks per year / 365 days per year) = 85%

Mesoscale MOBILE6.2 Emission Factor Summary

MAX Summer/Winter

Year	Speed	VOC	NOX	CO2
2012	Idle	5.53	3.3975	1403.25
2012	2.5	2.212	1.359	561.3
2012	5	0.948	1.221	561.3
2012	10	0.574	1.021	561.3
2012	15	0.462	0.889	561.3
2012	20	0.399	0.812	561.3
2012	25	0.364	0.766	561.3
2012	30	0.341	0.739	561.3
2012	35	0.325	0.733	561.3
2012	35R	0.357	0.773	561.3
2012	40	0.317	0.75	561.3
2012	45	0.312	0.783	561.3
2012	50	0.307	0.832	561.3
2012	55	0.302	0.902	561.3
2012	60	0.301	1.001	561.3
2012	65	0.301	1.194	561.3

Year	Speed	VOC	NOX	CO2
2022	Idle	3.58	1.065	1423.45
2022	2.5	1.432	0.426	569.38
2022	5	0.601	0.375	569.38
2022	10	0.357	0.312	569.38
2022	15	0.284	0.27	569.38
2022	20	0.24	0.247	569.38
2022	25	0.216	0.234	569.38
2022	30	0.2	0.226	569.38
2022	35	0.188	0.223	569.38
2022	35R	0.2	0.255	569.38
2022	40	0.181	0.229	569.38
2022	45	0.178	0.238	569.38
2022	50	0.175	0.251	569.38
2022	55	0.173	0.268	569.38
2022	60	0.173	0.292	569.38
2022	65	0.174	0.325	569.38

All factors in grams/mile except Idle (grams/hour)

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project	2012 Existing Friday AM Peak			2012 Existing Friday PM Peak			2012 Existing Saturday Midday Peak		
Intersections (Signalized)	LOS RANK	COMB. RANK	Traffic Volume RANK	LOS RANK	COMB. RANK	Traffic Volume RANK	LOS RANK	COMB. RANK	Traffic Volume RANK
2. Galleria Mall Drive South/County Street	17	39	22	19	40	21	18	38	20
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	17	38	21	13	35	22	12	34	22
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	17	18	1	19	20	1	18	20	2
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	10	14	4	4	7	3	4	8	4
9. Mozzone Boulevard/County Street (Route 140)	17	29	12	13	24	11	18	26	8
11. Erika Drive/County Street (Route 140)	10	21	11	10	19	9	4	10	6
12. Hart Street/County Street (Route 140)	1	10	9	1	7	6	1	6	5
15. Washington Street/Broadway (Route 138)	4	21	17	4	19	15	4	19	15
17. Oak Street /Washington Street/Tremont Street (Route 140)	4	14	10	4	17	13	4	18	14
18. Cohannet Street (Route 140) / Weir Street (Route 138)	10	18	8	19	26	7	12	19	7
22. High Street/Winthrop Street (Route 140)	4	22	18	3	19	16	4	20	16
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	4	19	15	10	28	18	4	17	13
33. County Street (Route 140)/Riverway Ext.	4	18	14	13	30	17	4	22	18
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	1	4	3	4	8	4	3	6	3
35. Winthrop Street (Route 44)/Highland Street	4	24	20	4	23	19	4	21	17
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	10	29	19	4	24	20	18	39	21
47. Cape Highway (Route 44)/Church Street	10	23	13	13	25	12	12	21	9
49. Cape Highway (Route 44)/Orchard Street	3	5	2	1	3	2	2	3	1
50. Broadway (Route 138)/I-495 NB Ramps	10	17	7	10	18	8	12	24	12
51. Broadway (Route 138)/I-495 SB Ramps	10	16	6	13	18	5	12	23	11
52. Pleasant Street (Route 104)/Route 24 NB Ramps	17	22	5	19	29	10	18	28	10
53. Pleasant Street (Route 104)/Route 24 SB Ramps	17	33	16	13	27	14	12	31	19

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project	2022 No Action Friday AM Peak			2022 No Action Friday PM Peak			2022 No Action Saturday Midday Peak		
Intersections (Signalized)	LOS RANK	COMB. RANK	Traffic Volume RANK	LOS RANK	COMB. RANK	Traffic Volume RANK	LOS RANK	COMB. RANK	Traffic Volume RANK
2. Galleria Mall Drive South/County Street	18	40	22	19	40	21	20	39	19
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	11	32	21	16	35	19	11	32	21
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	18	19	1	19	20	1	20	22	2
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	11	15	4	3	6	3	4	8	4
9. Mozzone Boulevard/County Street (Route 140)	18	32	14	11	22	11	11	19	8
11. Erika Drive/County Street (Route 140)	11	24	13	11	20	9	4	10	6
12. Hart Street/County Street (Route 140)	3	12	9	4	9	5	2	7	5
15. Washington Street/Broadway (Route 138)	3	20	17	4	19	15	4	19	15
17. Oak Street /Washington Street/Tremont Street (Route 140)	3	13	10	4	17	13	4	18	14
18. Cohannet Street (Route 140) / Weir Street (Route 138)	11	19	8	19	26	7	11	18	7
22. High Street/Winthrop Street (Route 140)	3	21	18	1	17	16	4	20	16
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	3	18	15	11	29	18	4	17	13
33. County Street (Route 140)/Riverway Ext.	3	15	12	11	28	17	11	28	17
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	2	5	3	4	8	4	2	5	3
35. Winthrop Street (Route 44)/Highland Street	3	23	20	4	26	22	4	22	18
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	11	30	19	4	24	20	11	33	22
47. Cape Highway (Route 44)/Church Street	11	22	11	11	23	12	11	20	9
49. Cape Highway (Route 44)/Orchard Street	1	3	2	1	3	2	1	2	1
50. Broadway (Route 138)/I-495 NB Ramps	11	18	7	4	12	8	11	23	12
51. Broadway (Route 138)/I-495 SB Ramps	3	9	6	16	22	6	11	22	11
52. Pleasant Street (Route 104)/Route 24 NB Ramps	18	23	5	19	29	10	20	30	10
53. Pleasant Street (Route 104)/Route 24 SB Ramps	18	34	16	16	30	14	11	31	20

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project	2022 Build Alternative A Friday AM Peak			2022 Build Alternative A Friday PM Peak			2022 Build Alternative A Saturday Midday Peak		
Intersections (Signalized)	LOS RANK	COMB. RANK	Traffic Volume RANK	LOS RANK	COMB. RANK	Traffic Volume RANK	LOS RANK	COMB. RANK	Traffic Volume RANK
2. Galleria Mall Drive South/County Street	18	40	22	19	34	15	20	35	15
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	11	32	21	1	7	6	11	23	12
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	18	19	1	19	20	1	20	21	1
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	11	15	4	1	3	2	2	5	3
9. Mozzone Boulevard/County Street (Route 140)	18	32	14	12	24	12	11	19	8
11. Erika Drive/County Street (Route 140)	11	23	12	12	21	9	6	12	6
12. Hart Street/County Street (Route 140)	3	12	9	6	11	5	2	7	5
15. Washington Street/Broadway (Route 138)	3	20	17	6	24	18	6	23	17
17. Oak Street /Washington Street/Tremont Street (Route 140)	3	13	10	6	20	14	6	22	16
18. Cohannet Street (Route 140) / Weir Street (Route 138)	11	19	8	19	27	8	11	18	7
22. High Street/Winthrop Street (Route 140)	3	21	18	1	18	17	2	20	18
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	3	18	15	12	33	21	6	19	13
33. County Street (Route 140)/Riverway Ext.	3	14	11	12	31	19	11	30	19
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	1	4	3	5	9	4	2	6	4
35. Winthrop Street (Route 44)/Highland Street	3	23	20	6	26	20	6	26	20
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	11	30	19	6	28	22	11	33	22
47. Cape Highway (Route 44)/Church Street	11	24	13	12	25	13	11	20	9
49. Cape Highway (Route 44)/Orchard Street	1	3	2	1	4	3	1	3	2
50. Broadway (Route 138)/I-495 NB Ramps	11	18	7	6	16	10	11	25	14
51. Broadway (Route 138)/I-495 SB Ramps	3	9	6	17	24	7	11	22	11
52. Pleasant Street (Route 104)/Route 24 NB Ramps	18	23	5	19	30	11	20	30	10
53. Pleasant Street (Route 104)/Route 24 SB Ramps	18	34	16	17	33	16	11	32	21

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project	2022 Build Alternative A Mitigated Friday AM Peak			2022 Build Alternative A Mitigated Friday PM Peak			2022 Build Alternative A Mitigated Saturday Midday Peak		
Intersections (Signalized)	LOS RANK	COMB. RANK	Traffic Volume RANK	LOS RANK	COMB. RANK	Traffic Volume RANK	LOS RANK	COMB. RANK	Traffic Volume RANK
2. Galleria Mall Drive South/County Street	17	39	22	19	34	15	18	33	15
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	11	32	21	11	17	6	4	16	12
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	17	18	1	19	20	1	18	19	1
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	17	21	4	3	5	2	18	21	3
9. Mozzone Boulevard/County Street (Route 140)	17	31	14	16	28	12	18	26	8
11. Erika Drive/County Street (Route 140)	11	23	12	11	20	9	4	10	6
12. Hart Street/County Street (Route 140)	3	12	9	3	8	5	2	7	5
15. Washington Street/Broadway (Route 138)	3	20	17	3	21	18	4	21	17
17. Oak Street /Washington Street/Tremont Street (Route 140)	3	13	10	3	17	14	4	20	16
18. Cohannet Street (Route 140) / Weir Street (Route 138)	11	19	8	19	27	8	11	18	7
22. High Street/Winthrop Street (Route 140)	3	21	18	3	20	17	4	22	18
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	3	18	15	11	32	21	4	17	13
33. County Street (Route 140)/Riverway Ext.	3	14	11	11	30	19	11	30	19
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	1	4	3	2	6	4	2	6	4
35. Winthrop Street (Route 44)/Highland Street	3	23	20	3	23	20	4	24	20
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	11	30	19	3	25	22	11	33	22
47. Cape Highway (Route 44)/Church Street	11	24	13	11	24	13	11	20	9
49. Cape Highway (Route 44)/Orchard Street	1	3	2	1	4	3	1	3	2
50. Broadway (Route 138)/I-495 NB Ramps	11	18	7	3	13	10	11	25	14
51. Broadway (Route 138)/I-495 SB Ramps	3	9	6	16	23	7	11	22	11
52. Pleasant Street (Route 104)/Route 24 NB Ramps	17	22	5	19	30	11	18	28	10
53. Pleasant Street (Route 104)/Route 24 SB Ramps	17	33	16	16	32	16	11	32	21

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project	2022 Build Alternative B Friday AM Peak			2022 Build Alternative B Friday PM Peak			2022 Build Alternative B Saturday Midday Peak		
Intersections (Signalized)	LOS RANK	COMB. RANK	Traffic Volume RANK	LOS RANK	COMB. RANK	Traffic Volume RANK	LOS RANK	COMB. RANK	Traffic Volume RANK
2. Galleria Mall Drive South/County Street	18	40	22	19	37	18	20	35	15
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	11	32	21	1	13	12	11	29	18
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	18	19	1	19	20	1	20	21	1
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	11	15	4	1	3	2	4	7	3
9. Mozzone Boulevard/County Street (Route 140)	18	32	14	12	23	11	11	19	8
11. Erika Drive/County Street (Route 140)	11	24	13	12	21	9	4	10	6
12. Hart Street/County Street (Route 140)	3	12	9	5	10	5	2	7	5
15. Washington Street/Broadway (Route 138)	3	20	17	5	21	16	4	20	16
17. Oak Street /Washington Street/Tremont Street (Route 140)	3	13	10	5	19	14	4	18	14
18. Cohannet Street (Route 140) / Weir Street (Route 138)	11	19	8	19	26	7	11	18	7
22. High Street/Winthrop Street (Route 140)	3	21	18	1	18	17	4	21	17
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	3	18	15	12	32	20	4	17	13
33. County Street (Route 140)/Riverway Ext.	3	15	12	12	31	19	11	30	19
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	2	5	3	5	9	4	2	6	4
35. Winthrop Street (Route 44)/Highland Street	3	23	20	5	27	22	4	24	20
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	11	30	19	5	26	21	11	33	22
47. Cape Highway (Route 44)/Church Street	11	22	11	12	25	13	11	20	9
49. Cape Highway (Route 44)/Orchard Street	1	3	2	1	4	3	1	3	2
50. Broadway (Route 138)/I-495 NB Ramps	11	18	7	5	13	8	11	23	12
51. Broadway (Route 138)/I-495 SB Ramps	3	9	6	17	23	6	11	22	11
52. Pleasant Street (Route 104)/Route 24 NB Ramps	18	23	5	19	29	10	20	30	10
53. Pleasant Street (Route 104)/Route 24 SB Ramps	18	34	16	17	32	15	11	32	21

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project	2022 Build Alternative B Mitigated Friday AM Peak			2022 Build Alternative B Mitigated Friday PM Peak			2022 Build Alternative B Mitigated Saturday Midday Peak		
Intersections (Signalized)	LOS RANK	COMB. RANK	Traffic Volume RANK	LOS RANK	COMB. RANK	Traffic Volume RANK	LOS RANK	COMB. RANK	Traffic Volume RANK
2. Galleria Mall Drive South/County Street	18	40	22	19	37	18	20	35	15
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	11	32	21	10	22	12	4	22	18
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	18	19	1	19	20	1	20	21	1
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	11	15	4	10	12	2	11	14	3
9. Mozzone Boulevard/County Street (Route 140)	18	32	14	10	21	11	11	19	8
11. Erika Drive/County Street (Route 140)	11	24	13	10	19	9	4	10	6
12. Hart Street/County Street (Route 140)	3	12	9	3	8	5	2	7	5
15. Washington Street/Broadway (Route 138)	3	20	17	3	19	16	4	20	16
17. Oak Street /Washington Street/Tremont Street (Route 140)	3	13	10	3	17	14	4	18	14
18. Cohannet Street (Route 140) / Weir Street (Route 138)	11	19	8	19	26	7	11	18	7
22. High Street/Winthrop Street (Route 140)	3	21	18	1	18	17	4	21	17
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	3	18	15	10	30	20	4	17	13
33. County Street (Route 140)/Riverway Ext.	3	15	12	10	29	19	11	30	19
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	2	5	3	3	7	4	2	6	4
35. Winthrop Street (Route 44)/Highland Street	3	23	20	3	25	22	4	24	20
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	11	30	19	3	24	21	11	33	22
47. Cape Highway (Route 44)/Church Street	11	22	11	10	23	13	11	20	9
49. Cape Highway (Route 44)/Orchard Street	1	3	2	1	4	3	1	3	2
50. Broadway (Route 138)/I-495 NB Ramps	11	18	7	3	11	8	11	23	12
51. Broadway (Route 138)/I-495 SB Ramps	3	9	6	17	23	6	11	22	11
52. Pleasant Street (Route 104)/Route 24 NB Ramps	18	23	5	19	29	10	20	30	10
53. Pleasant Street (Route 104)/Route 24 SB Ramps	18	34	16	17	32	15	11	32	21

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project

Intersections (Signalized)	All Modeled Cases		
	Worst 3 By LOS	Worst 3 By ADT	Overall
2. Galleria Mall Drive South/County Street	390	389	779
3. Overpass Connector/Route 140 NB Ramps/Stevens Street	213	363	576
5. Route 24 NB Ramp (Exit 12B)/County Street (Route 140)	390	23	413
6. Route 24 SB Ramp (Exit 12A)/County Street (Route 140)	174	67	241
9. Mozzone Boulevard/County Street (Route 140)	310	231	541
11. Erika Drive/County Street (Route 140)	183	190	373
12. Hart Street/County Street (Route 140)	57	134	191
15. Washington Street/Broadway (Route 138)	80	347	427
17. Oak Street /Washington Street/Tremont Street (Route 140)	80	268	348
18. Cohannet Street (Route 140) / Weir Street (Route 138)	286	156	442
22. High Street/Winthrop Street (Route 140)	61	362	423
23. Main Street (Route 140/44)/Church Green (Route 44)/Summer Street (Route 140)	129	334	463
33. County Street (Route 140)/Riverway Ext.	171	341	512
34. Dean Street/Longmeadow Road/Gordon Owen Parkway	50	75	125
35. Winthrop Street (Route 44)/Highland Street	80	419	499
39. Bedford Street (Route 18)/Rhode Island Road(Route 79)	187	434	621
47. Cape Highway (Route 44)/Church Street	233	236	469
49. Cape Highway (Route 44)/Orchard Street	24	45	69
50. Broadway (Route 138)/I-495 NB Ramps	187	199	386
51. Broadway (Route 138)/I-495 SB Ramps	216	162	378
52. Pleasant Street (Route 104)/Route 24 NB Ramps	390	177	567
53. Pleasant Street (Route 104)/Route 24 SB Ramps	311	361	672

First Light - Taunton MA
Calculation of Microscale Modeling Emission Factors
Summary of MOBILE6 Output

Carbon Monoxide Only

Queues	Idle
Free Flow	30 mph
Right Turns	10 mph
Left Turns	15 mph

Winter	**2012**	**2022**	**Units**
Idle	50.215	45.893	g/hr
2.5 mph	20.086	18.357	g/mile
10 mph	10.834	10.310	g/mile
15 mph	9.736	9.364	g/mile
30 mph	8.682	8.468	g/mile

Note: Winter CO emission factors are generally higher than Summer and are conservatively used

.

```
************************************************************************
* MOBILE6.2.03 (24-Sep-2003)                                           *
* Input file: MA12PMO3.INP (file 1, run 1).                            *
************************************************************************
* *** Summer 2012 ***

* Reading Registration Distributions from the following external
* data file: 2005_REG.D
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.999     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.999     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)

* Reading I/M program description records from the following external
* data file: 09NEWIM.D
* 15 Year Exemption Age
```

```
* New Annual OBD Exhaust I/M program for Light Duty MY 1996 through 2007 vehicles <=8,500 lb GVWR
* New Annual OBD Exhaust I/M program for Light Duty and Medium duty MY 2008 and later <=14,000 lb GVWR
* New Annual OBD Evap I/M program for Light Duty MY 1996 through 2007 vehicles <=8,500 lb GVWR
* New Annual OBD Evap I/M program for for Light Duty and Medium duty MY 2008 and later <=14,000 lb GVWR
  M601 Comment:
               User has enabled STAGE II REFUELING.


* Reading 94+ LEV IMPLEMENTATION SCHEDULE from the following external
* data file: MA_LEV2.D

  Reading User Supplied Tier2 Exhaust bin phase-in fractions

     Data read from file: LEV2EXH.D


  Reading User Supplied Tier2 EVAP phase-in fractions

     Data read from file: LEV2EVAP.D


  Reading User Supplied Tier2 50K certification standards

     Data read from file: LEV2CERT.D

  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M614 Comment:
               User supplied diesel sale fractions.

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012DEFAULT SPEED - Summer, with PM2.5
* File 1, Run 1, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV
```

```
* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
*** I/M credits for Tech1&2 vehicles were read from the following external
    data file: TECH12.D
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
 HDDV DEFEAT DEVICE EFFECTS ARE PRESENT. THE REBUILD FRACTION IS 0.10.

* Reading Ammonia (NH3) Basic Emissiion Rates
* from the external data file PMNH3BER.D

* Reading Ammonia (NH3) Sulfur Deterioration Rates
* from the external data file PMNH3SDR.D

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC    All Veh
               GVWR:                <6000     >6000     (All)
```

VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3

Composite Emission Factors (g/mi):

Composite VOC :	0.370	0.294	0.357	0.312	0.415	0.172	0.191	0.327	3.76	0.348
Composite CO :	4.77	4.54	4.97	4.66	6.15	1.355	0.458	1.229	17.09	4.495
Composite NOX :	0.301	0.301	0.449	0.343	1.149	0.413	0.272	5.005	1.27	0.763
Composite CO2 :	368.0	479.0	624.0	519.9	895.4	314.1	554.0	1400.8	177.4	561.35

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012Idle Scenario - Summer (multiply g/mi by 2.5 mph to get g/hr), with PM2.5
* File 1, Run 1, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of  2.5
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
```

```
 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  July
                         Altitude:  Low
                Minimum Temperature:  68.0 (F)
                Maximum Temperature:  94.0 (F)
                  Absolute Humidity:   75. grains/lb
                Fuel Sulfur Content:   30. ppm

                Exhaust I/M Program:  Yes
                   Evap I/M Program:  Yes
                        ATP Program:  Yes
                   Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	2.631	1.903	2.148	1.972	2.975	0.404	0.458	1.013	12.04	2.165
Composite CO :	13.60	11.09	12.26	11.42	28.54	4.047	1.460	5.452	119.90	12.607
Composite NOX :	0.691	0.584	0.862	0.663	0.841	0.667	0.439	7.794	1.12	1.291
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 5 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 3.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
```

```
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of  5.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                           Month:  July
                        Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
  ------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.977     0.762     0.919     0.806     1.400     0.362     0.410     0.890      8.32     0.916
```

```
     Composite CO  :      8.09      7.09      7.80      7.29     22.80     3.408     1.222     4.450     70.96     8.097
     Composite NOX :     0.586     0.510     0.749     0.577     0.862     0.601     0.396     7.035      1.06     1.146
     Composite CO2 :    368.0     478.9     623.9     519.9     895.3     314.0     553.9    1400.7     177.4    561.30
   ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 10 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 4.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 10.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                           Month:  July
                        Altitude:  Low
              Minimum Temperature:  68.0 (F)
```

```
             Maximum Temperature:  94.0 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.557	0.449	0.553	0.479	0.849	0.297	0.336	0.699	5.49	0.554
Composite CO :	5.57	5.16	5.67	5.31	15.17	2.527	0.895	3.069	36.41	5.668
Composite NOX :	0.453	0.413	0.609	0.468	0.906	0.502	0.330	5.885	1.00	0.946
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 15 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 5.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
```

```
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 15.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                           Month:  July
                        Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.456     0.365     0.447     0.388     0.643    0.251     0.282     0.561      4.53     0.449
     Composite CO  :      4.84      4.54      5.00      4.67     10.66     1.983     0.692     2.214     25.21     4.806
     Composite NOX :      0.374     0.352     0.523     0.400     0.950    0.434     0.285     5.099      1.01     0.817
     Composite CO2 :    368.0     478.9     623.9     519.9     895.3    314.0     553.9    1400.7      177.4    561.30
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
```

```
* 2012 20 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 6.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 20.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
```

```
                    ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
             GVWR:                 <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
 ---------------------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
    Composite VOC :      0.401     0.316     0.387     0.336     0.517     0.217     0.243     0.460      4.08     0.387
    Composite CO  :      4.42      4.19      4.62      4.31      7.92     1.637     0.563     1.672     20.06     4.308
    Composite NOX :      0.332     0.321     0.479     0.365     0.994     0.388     0.255     4.573      1.06     0.742
    Composite CO2 :    368.0     478.9     623.9     519.9     895.3    314.0     553.9    1400.7      177.4    561.30
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 25 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 7.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 25.0
```

```
           will be used for all hours of the day.  100% of VMT
           has been assigned to the arterial/collector roadway
           type for all hours of the day and all vehicle types.
 M 48 Warning:
             there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
                  Calendar Year:  2012
                          Month:  July
                       Altitude:  Low
             Minimum Temperature:  68.0 (F)
             Maximum Temperature:  94.0 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.371	0.292	0.357	0.310	0.442	0.191	0.214	0.386	3.81	0.353
Composite CO :	4.24	4.04	4.45	4.15	6.21	1.414	0.480	1.322	16.90	4.056
Composite NOX :	0.307	0.302	0.453	0.344	1.037	0.359	0.237	4.242	1.12	0.695
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 30 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 8.
* # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV
```

```
* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 30.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
```

VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3

Composite Emission Factors (g/mi):

Composite VOC :	0.351	0.277	0.338	0.294	0.391	0.173	0.192	0.331	3.60	0.331
Composite CO :	4.19	4.01	4.41	4.12	5.15	1.268	0.426	1.093	14.61	3.954
Composite NOX :	0.290	0.289	0.435	0.330	1.081	0.344	0.227	4.069	1.18	0.669
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 35 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 9.
* # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 35.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
```

```
 LEV phase-in data read from file MA_LEV2.D
                   Calendar Year:  2012
                           Month:  July
                        Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.336	0.266	0.325	0.283	0.355	0.159	0.176	0.290	3.44	0.314
Composite CO :	4.25	4.06	4.47	4.18	4.51	1.174	0.391	0.946	12.92	3.963
Composite NOX :	0.279	0.283	0.427	0.323	1.125	0.341	0.225	4.034	1.22	0.661
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # #
* 2012 40 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 10.
* # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV
```

```
* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 40.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.328     0.261     0.318     0.277     0.330     0.149     0.165     0.260      3.33     0.304
     Composite CO  :      4.51      4.30      4.71      4.41      4.18     1.118     0.370     0.857     11.74     4.151
```

```
     Composite NOX :      0.283     0.288     0.432     0.328     1.168    0.350     0.230     4.134      1.25     0.675
     Composite CO2 :    368.0     478.9     623.9     519.9     895.3    314.0     553.9    1400.7     177.4    561.30
   ---------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 45 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 11.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
             The user supplied arterial average speed of 45.0
             will be used for all hours of the day.  100% of VMT
             has been assigned to the arterial/collector roadway
             type for all hours of the day and all vehicle types.
  M 48 Warning:
               there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                     Calendar Year:  2012
                             Month:  July
                          Altitude:  Low
               Minimum Temperature:  68.0 (F)
               Maximum Temperature:  94.0 (F)
```

```
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.320	0.257	0.312	0.272	0.312	0.141	0.156	0.238	3.27	0.297
Composite CO :	4.77	4.53	4.96	4.65	4.08	1.089	0.360	0.813	11.00	4.355
Composite NOX :	0.288	0.294	0.439	0.335	1.212	0.371	0.244	4.379	1.27	0.703
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 50 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 12.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV
```

```
* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 50.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.314	0.253	0.307	0.268	0.298	0.136	0.150	0.223	3.25	0.290
Composite CO :	5.02	4.77	5.20	4.89	4.22	1.085	0.358	0.807	10.70	4.572
Composite NOX :	0.294	0.300	0.447	0.342	1.256	0.407	0.268	4.797	1.34	0.746
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 55 mph Scenario - Summer, with PM2.5
```

```
* File 1, Run 1, Scenario 13.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 55.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
```

```
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
             GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
 ---------------------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
    Composite VOC :      0.309     0.251     0.303     0.265     0.289    0.133     0.147     0.213      3.25     0.286
    Composite CO  :      5.28      5.01      5.45      5.13      4.60     1.105     0.366     0.838     10.70     4.805
    Composite NOX :      0.300     0.307     0.455     0.349     1.300    0.463     0.305     5.438      1.47     0.809
    Composite CO2 :    368.0     478.9     623.9     519.9     895.3    314.0     553.9    1400.7      177.4    561.30
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 60 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 14.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 60.0
            will be used for all hours of the day.  100% of VMT
```

```
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                           Month:  July
                        Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.305	0.249	0.300	0.263	0.285	0.131	0.145	0.208	3.63	0.285
Composite CO :	5.54	5.25	5.70	5.38	5.31	1.152	0.383	0.910	18.20	5.083
Composite NOX :	0.306	0.314	0.463	0.356	1.343	0.545	0.359	6.382	1.61	0.898
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 65 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 15.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV
```

```
* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M582 Warning:
            The user supplied freeway average speed of 65.0
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
```

```
   VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.1      9.9      32.4      18.4       7.3      50.0      16.3
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.302     0.248     0.297     0.262     0.284    0.131     0.145     0.208      4.02     0.285
     Composite CO  :      5.81      5.49      5.96      5.62      6.47     1.231     0.412     1.036     25.70     5.385
     Composite NOX :      0.312     0.321     0.471     0.363     1.387    0.664     0.437     8.357      1.74     1.076
     Composite CO2 :    368.0     478.9     623.9     519.9     895.3    314.0     553.9    1400.7      177.4    561.30
  ---------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 35 mph FREEWAY RAMP Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 16.
* # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M515 Warning:
            The combined freeway and ramp average speed entered
            cannot be greater than 34.6 miles per hour.
            The average speed will be reset to this value.
  M582 Warning:
            The user supplied freeway average speed of 34.6
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
```

```
           and freeway ramps for all hours of the day and all
            vehicle types.
 M 48 Warning:
            there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
                 Calendar Year:  2012
                         Month:  July
                      Altitude:  Low
            Minimum Temperature:  68.0 (F)
            Maximum Temperature:  94.0 (F)
              Absolute Humidity:   75. grains/lb
            Fuel Sulfur Content:   30. ppm

            Exhaust I/M Program:  Yes
               Evap I/M Program:  Yes
                    ATP Program:  Yes
               Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.369	0.289	0.353	0.307	0.358	0.160	0.177	0.293	3.45	0.339
Composite CO :	7.02	6.09	6.37	6.17	4.55	1.181	0.394	0.956	12.96	5.940
Composite NOX :	0.328	0.333	0.506	0.382	1.121	0.341	0.225	3.751	1.22	0.685
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 Idle Scenario - Summer (multiply g/mi by 2.5 mph to get g/hr), with PM10
* File 1, Run 1, Scenario 17.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV
```

```
* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
           The user supplied arterial average speed of  2.5
           will be used for all hours of the day.  100% of VMT
           has been assigned to the arterial/collector roadway
           type for all hours of the day and all vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                   Calendar Year:  2012
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  68.0 (F)
             Maximum Temperature:  94.0 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
             GVWR:                 <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
```

```
 Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      2.631     1.903     2.148     1.972     2.975    0.404     0.458     1.013     12.04     2.165
     Composite CO  :     13.60     11.09     12.26     11.42     28.54     4.047     1.460     5.452    119.90    12.607
     Composite NOX :      0.691     0.584     0.862     0.663     0.841    0.667     0.439     7.794      1.12     1.291
     Composite CO2 :    368.0     478.9     623.9     519.9     895.3    314.0     553.9    1400.7      177.4    561.30
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 5 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 18.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of  5.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
```

```
                  Calendar Year:  2012
                         Month:  July
                      Altitude:  Low
             Minimum Temperature:  68.0 (F)
             Maximum Temperature:  94.0 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.977	0.762	0.919	0.806	1.400	0.362	0.410	0.890	8.32	0.916
Composite CO :	8.09	7.09	7.80	7.29	22.80	3.408	1.222	4.450	70.96	8.097
Composite NOX :	0.586	0.510	0.749	0.577	0.862	0.601	0.396	7.035	1.06	1.146
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 10 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 19.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV
```

```
* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 10.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.557     0.449     0.553     0.479     0.849     0.297     0.336     0.699      5.49     0.554
     Composite CO  :      5.57      5.16      5.67      5.31     15.17      2.527     0.895     3.069     36.41     5.668
     Composite NOX :      0.453     0.413     0.609     0.468     0.906     0.502     0.330     5.885      1.00     0.946
```

```
     Composite CO2 :    368.0     478.9     623.9     519.9     895.3    314.0     553.9    1400.7      177.4    561.30
  ------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 15 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 20.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 15.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
```

```
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.456	0.365	0.447	0.388	0.643	0.251	0.282	0.561	4.53	0.449
Composite CO :	4.84	4.54	5.00	4.67	10.66	1.983	0.692	2.214	25.21	4.806
Composite NOX :	0.374	0.352	0.523	0.400	0.950	0.434	0.285	5.099	1.01	0.817
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 20 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 21.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV
```

```
* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 20.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                           Month:  July
                        Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
  Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
   ---------------------------------------------------------------------------------------------------------------------
  Composite Emission Factors (g/mi):
      Composite VOC :      0.401     0.316     0.387     0.336     0.517    0.217     0.243     0.460      4.08     0.387
      Composite CO  :      4.42      4.19      4.62      4.31      7.92     1.637     0.563     1.672     20.06     4.308
      Composite NOX :      0.332     0.321     0.479     0.365     0.994    0.388     0.255     4.573      1.06     0.742
      Composite CO2 :    368.0     478.9     623.9     519.9     895.3    314.0     553.9    1400.7      177.4    561.30
   ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 25 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 22.
```

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 25.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.371	0.292	0.357	0.310	0.442	0.191	0.214	0.386	3.81	0.353
Composite CO :	4.24	4.04	4.45	4.15	6.21	1.414	0.480	1.322	16.90	4.056
Composite NOX :	0.307	0.302	0.453	0.344	1.037	0.359	0.237	4.242	1.12	0.695
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 30 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 23.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 30.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
```

```
           type for all hours of the day and all vehicle types.
 M 48 Warning:
             there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
                   Calendar Year:  2012
                           Month:  July
                        Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.351	0.277	0.338	0.294	0.391	0.173	0.192	0.331	3.60	0.331
Composite CO :	4.19	4.01	4.41	4.12	5.15	1.268	0.426	1.093	14.61	3.954
Composite NOX :	0.290	0.289	0.435	0.330	1.081	0.344	0.227	4.069	1.18	0.669
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 35 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 24.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
```

```
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 35.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
  Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
```

```
  ------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.336     0.266     0.325     0.283     0.355    0.159     0.176     0.290      3.44     0.314
     Composite CO  :      4.25      4.06      4.47      4.18      4.51     1.174     0.391     0.946     12.92     3.963
     Composite NOX :      0.279     0.283     0.427     0.323     1.125    0.341     0.225     4.034      1.22     0.661
     Composite CO2 :    368.0     478.9     623.9     519.9     895.3    314.0     553.9    1400.7      177.4    561.30
  ------------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 40 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 25.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 40.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
```

```
                     Month:  July
                  Altitude:  Low
          Minimum Temperature:  68.0 (F)
          Maximum Temperature:  94.0 (F)
            Absolute Humidity:   75. grains/lb
          Fuel Sulfur Content:   30. ppm

          Exhaust I/M Program:  Yes
             Evap I/M Program:  Yes
                  ATP Program:  Yes
             Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.328	0.261	0.318	0.277	0.330	0.149	0.165	0.260	3.33	0.304
Composite CO :	4.51	4.30	4.71	4.41	4.18	1.118	0.370	0.857	11.74	4.151
Composite NOX :	0.283	0.288	0.432	0.328	1.168	0.350	0.230	4.134	1.25	0.675
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 45 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 26.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
```

```
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 45.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                           Month:  July
                        Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.320	0.257	0.312	0.272	0.312	0.141	0.156	0.238	3.27	0.297
Composite CO :	4.77	4.53	4.96	4.65	4.08	1.089	0.360	0.813	11.00	4.355
Composite NOX :	0.288	0.294	0.439	0.335	1.212	0.371	0.244	4.379	1.27	0.703
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
  ------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 50 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 27.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 50.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm
```

```
             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
 ---------------------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
    Composite VOC :      0.314     0.253     0.307     0.268     0.298     0.136     0.150     0.223      3.25     0.290
    Composite CO  :      5.02      4.77      5.20      4.89      4.22      1.085     0.358     0.807     10.70     4.572
    Composite NOX :      0.294     0.300     0.447     0.342     1.256     0.407     0.268     4.797      1.34     0.746
    Composite CO2 :    368.0     478.9     623.9     519.9     895.3     314.0     553.9    1400.7      177.4    561.30
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 55 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 28.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
```

```
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 55.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.309	0.251	0.303	0.265	0.289	0.133	0.147	0.213	3.25	0.286
Composite CO :	5.28	5.01	5.45	5.13	4.60	1.105	0.366	0.838	10.70	4.805
Composite NOX :	0.300	0.307	0.455	0.349	1.300	0.463	0.305	5.438	1.47	0.809
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 60 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 29.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

```
* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 60.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  68.0 (F)
              Maximum Temperature:  94.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.305	0.249	0.300	0.263	0.285	0.131	0.145	0.208	3.63	0.285
Composite CO :	5.54	5.25	5.70	5.38	5.31	1.152	0.383	0.910	18.20	5.083
Composite NOX :	0.306	0.314	0.463	0.356	1.343	0.545	0.359	6.382	1.61	0.898
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 65 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 30.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M582 Warning:
            The user supplied freeway average speed of 65.0
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
```

```
            vehicle types.
 M 48 Warning:
             there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
                  Calendar Year:  2012
                          Month:  July
                       Altitude:  Low
             Minimum Temperature:  68.0 (F)
             Maximum Temperature:  94.0 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.302	0.248	0.297	0.262	0.284	0.131	0.145	0.208	4.02	0.285
Composite CO :	5.81	5.49	5.96	5.62	6.47	1.231	0.412	1.036	25.70	5.385
Composite NOX :	0.312	0.321	0.471	0.363	1.387	0.664	0.437	8.357	1.74	1.076
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 35 mph FREEWAY RAMP Scenario - Summer, with PM10
* File 1, Run 1, Scenario 31.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
```

```
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M515 Warning:
            The combined freeway and ramp average speed entered
            cannot be greater than 34.6 miles per hour.
            The average speed will be reset to this value.
  M582 Warning:
            The user supplied freeway average speed of 34.6
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  July
                         Altitude:  Low
               Minimum Temperature:  68.0 (F)
               Maximum Temperature:  94.0 (F)
                 Absolute Humidity:   75. grains/lb
               Fuel Sulfur Content:   30. ppm

               Exhaust I/M Program:  Yes
                  Evap I/M Program:  Yes
                       ATP Program:  Yes
                  Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.369	0.289	0.353	0.307	0.358	0.160	0.177	0.293	3.45	0.339
Composite CO :	7.02	6.09	6.37	6.17	4.55	1.181	0.394	0.956	12.96	5.940
Composite NOX :	0.328	0.333	0.506	0.382	1.121	0.341	0.225	3.751	1.22	0.685
Composite CO2 :	368.0	478.9	623.9	519.9	895.3	314.0	553.9	1400.7	177.4	561.30

```
**************************************************************************
* MOBILE6.2.03 (24-Sep-2003)                                             *
* Input file: MA12PM03.INP (file 1, run 2).                              *
**************************************************************************
* *** Winter 2012 ***

* Reading Registration Distributions from the following external
* data file: 2005_REG.D
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.999     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.999     MYR sum not = 1. (will normalize)
```

```
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)

* Reading I/M program description records from the following external
* data file: 09NEWIM.D
* 15 Year Exemption Age
* New Annual OBD Exhaust I/M program for Light Duty MY 1996 through 2007 vehicles <=8,500 lb GVWR
* New Annual OBD Exhaust I/M program for Light Duty and Medium duty MY 2008 and later <=14,000 lb GVWR
* New Annual OBD Evap I/M program for Light Duty MY 1996 through 2007 vehicles <=8,500 lb GVWR
* New Annual OBD Evap I/M program for for Light Duty and Medium duty MY 2008 and later <=14,000 lb GVWR
  M601 Comment:
              User has enabled STAGE II REFUELING.


* Reading 94+ LEV IMPLEMENTATION SCHEDULE from the following external
* data file: MA_LEV2.D

  Reading User Supplied Tier2 Exhaust bin phase-in fractions

     Data read from file: LEV2EXH.D


  Reading User Supplied Tier2 EVAP phase-in fractions

     Data read from file: LEV2EVAP.D


  Reading User Supplied Tier2 50K certification standards

     Data read from file: LEV2CERT.D

  M616 Comment:
              User has supplied post-1999 sulfur levels.
  M614 Comment:
```

```
               User supplied diesel sale fractions.

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 DEFAULT SPEED - Winter, with PM2.5
* File 1, Run 2, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
*** I/M credits for Tech1&2 vehicles were read from the following external
    data file: TECH12.D
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
 HDDV DEFEAT DEVICE EFFECTS ARE PRESENT. THE REBUILD FRACTION IS 0.10.

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
               Minimum Temperature:  35.0 (F)
               Maximum Temperature:  45.0 (F)
                 Absolute Humidity:   75. grains/lb
               Fuel Sulfur Content:   30. ppm
```

```
             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
 ---------------------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
    Composite VOC :      0.368     0.310     0.406     0.337     0.425     0.167     0.198     0.335      3.37     0.361
    Composite CO  :     10.66      9.92     10.07      9.96      7.53     1.327     0.466     1.319     15.79     9.363
    Composite NOX :      0.317     0.352     0.534     0.404     1.336     0.409     0.290     5.427      1.68     0.843
    Composite CO2 :    368.0     478.9     623.9     519.8     895.5     314.1     554.0    1402.0      177.4    559.99
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 Idle Scenario - Winter (multiply g/mi by 2.5 mph to get g/hr), with PM2.5
* File 1, Run 2, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
```

```
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of  2.5
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	2.660	1.917	2.251	2.011	3.340	0.395	0.476	1.037	11.37	2.212
Composite CO :	21.61	19.56	20.93	19.95	34.92	3.991	1.489	5.849	100.99	20.086
Composite NOX :	0.589	0.645	0.974	0.738	0.978	0.660	0.469	8.448	1.48	1.359
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 5 mph Scenario - Winter, with PM2.5
```

```
* File 1, Run 2, Scenario 3.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of  5.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
```

```
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
 ---------------------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
    Composite VOC :      0.998     0.774     0.995     0.836     1.649    0.355     0.426     0.911      7.78     0.948
    Composite CO  :     14.80     13.63     14.25     13.80     27.90     3.359     1.247     4.775     60.45    14.016
    Composite NOX :      0.524     0.571     0.856     0.651     1.003    0.595     0.423     7.625      1.39     1.221
    Composite CO2 :    368.0     478.9     623.9     519.8     895.5    314.0     554.0    1401.9      177.4    559.95
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 10 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 4.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
```

```
           The user supplied arterial average speed of 10.0
           will be used for all hours of the day.  100% of VMT
           has been assigned to the arterial/collector roadway
           type for all hours of the day and all vehicle types.
 M112 Warning:
              Wintertime Reformulated Gasoline Rules Apply
 M 48 Warning:
             there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
                  Calendar Year:  2012
                          Month:  Jan.
                       Altitude:  Low
             Minimum Temperature:  35.0 (F)
             Maximum Temperature:  45.0 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.565	0.458	0.610	0.500	0.988	0.291	0.349	0.715	5.05	0.574
Composite CO :	11.66	10.82	11.10	10.90	18.57	2.487	0.912	3.292	31.83	10.834
Composite NOX :	0.427	0.469	0.705	0.535	1.054	0.496	0.353	6.379	1.32	1.021
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 15 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 5.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

```
* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 15.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
                Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
```

Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3

Composite Emission Factors (g/mi):

Composite VOC :	0.455	0.373	0.496	0.408	0.718	0.245	0.293	0.574	4.12	0.462
Composite CO :	10.74	9.96	10.15	10.02	13.05	1.948	0.705	2.376	22.56	9.736
Composite NOX :	0.365	0.403	0.610	0.461	1.105	0.429	0.305	5.528	1.33	0.889
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 20 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 6.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 20.0
            will be used for all hours of the day.  100% of VMT
```

```
           has been assigned to the arterial/collector roadway
           type for all hours of the day and all vehicle types.
 M112 Warning:
              Wintertime Reformulated Gasoline Rules Apply
 M 48 Warning:
             there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
                  Calendar Year:  2012
                          Month:  Jan.
                       Altitude:  Low
             Minimum Temperature:  35.0 (F)
             Maximum Temperature:  45.0 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.395	0.329	0.437	0.359	0.554	0.211	0.252	0.471	3.69	0.399
Composite CO :	10.29	9.53	9.68	9.57	9.69	1.606	0.574	1.794	18.29	9.156
Composite NOX :	0.333	0.370	0.563	0.424	1.156	0.384	0.273	4.957	1.40	0.812
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 25 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 7.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
```

```
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 25.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.364	0.305	0.404	0.333	0.456	0.187	0.222	0.395	3.42	0.364
Composite CO :	10.03	9.30	9.42	9.33	7.60	1.385	0.489	1.418	15.67	8.822
Composite NOX :	0.315	0.350	0.534	0.402	1.207	0.356	0.252	4.599	1.48	0.766
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 30 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 8.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 30.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
```

```
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
               there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                     Calendar Year:  2012
                             Month:  Jan.
                          Altitude:  Low
               Minimum Temperature:  35.0 (F)
               Maximum Temperature:  45.0 (F)
                 Absolute Humidity:   75. grains/lb
               Fuel Sulfur Content:   30. ppm

               Exhaust I/M Program:  Yes
                  Evap I/M Program:  Yes
                       ATP Program:  Yes
                  Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.345	0.290	0.386	0.317	0.391	0.168	0.199	0.338	3.22	0.341
Composite CO :	9.95	9.23	9.34	9.26	6.30	1.241	0.434	1.173	13.78	8.682
Composite NOX :	0.302	0.337	0.516	0.387	1.257	0.341	0.242	4.412	1.56	0.739
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 35 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 9.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV
```

```
* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 35.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC    All Veh
               GVWR:                <6000     >6000     (All)
```

VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3

Composite Emission Factors (g/mi):

Composite VOC :	0.332	0.281	0.372	0.307	0.347	0.155	0.183	0.297	3.07	0.325
Composite CO :	10.00	9.29	9.40	9.32	5.52	1.148	0.398	1.015	12.37	8.685
Composite NOX :	0.296	0.331	0.508	0.381	1.308	0.338	0.240	4.374	1.61	0.733
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 40 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 10.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 40.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
```

```
 M 48 Warning:
             there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
                   Calendar Year:  2012
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  35.0 (F)
             Maximum Temperature:  45.0 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.325	0.278	0.368	0.304	0.317	0.145	0.170	0.266	2.96	0.317
Composite CO :	10.31	9.59	9.73	9.63	5.11	1.092	0.376	0.920	11.40	8.928
Composite NOX :	0.303	0.338	0.516	0.388	1.359	0.346	0.246	4.482	1.65	0.750
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 45 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 11.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV
```

```
* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 45.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
```

```
 Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.320     0.277     0.364     0.301     0.296    0.137     0.162     0.243      2.90     0.312
     Composite CO  :     10.62      9.90     10.05      9.94      5.00     1.064     0.366     0.872     10.78     9.187
     Composite NOX :      0.313     0.347     0.526     0.398     1.410    0.367     0.261     4.748      1.68     0.783
     Composite CO2 :    368.0     478.9     623.9     519.8     895.5    314.0     554.0    1401.9      177.4    559.95
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 50 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 12.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 50.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
```

```
 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
                Minimum Temperature:  35.0 (F)
                Maximum Temperature:  45.0 (F)
                  Absolute Humidity:   75. grains/lb
                Fuel Sulfur Content:   30. ppm

                Exhaust I/M Program:  Yes
                   Evap I/M Program:  Yes
                        ATP Program:  Yes
                   Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.315	0.275	0.360	0.299	0.281	0.132	0.155	0.228	2.88	0.307
Composite CO :	10.92	10.21	10.38	10.25	5.16	1.060	0.364	0.866	10.53	9.462
Composite NOX :	0.322	0.356	0.537	0.407	1.461	0.403	0.286	5.201	1.77	0.832
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 55 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 13.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
```

```
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 55.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
  ---------------------------------------------------------------------------------------------------------------------
```

```
 Composite Emission Factors (g/mi):
     Composite VOC :      0.309     0.273     0.356     0.296     0.271    0.129     0.152     0.218      2.88     0.302
     Composite CO  :     11.23     10.51     10.70     10.57      5.63     1.080     0.372     0.899     10.53     9.752
     Composite NOX :      0.332     0.365     0.548     0.416     1.512    0.458     0.325     5.895      1.95     0.902
     Composite CO2 :    368.0     478.9     623.9     519.8     895.5    314.0     554.0    1401.9      177.4    559.95
   ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 60 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 14.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 60.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
```

```
                  Calendar Year:  2012
                         Month:  Jan.
                      Altitude:  Low
             Minimum Temperature:  35.0 (F)
             Maximum Temperature:  45.0 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.306	0.272	0.352	0.294	0.266	0.127	0.150	0.213	3.25	0.301
Composite CO :	11.53	10.82	11.03	10.88	6.50	1.126	0.389	0.977	16.75	10.084
Composite NOX :	0.342	0.374	0.559	0.426	1.563	0.539	0.383	6.918	2.13	1.001
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 65 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 15.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV
```

```
* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M582 Warning:
            The user supplied freeway average speed of 65.0
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M112 Warning:
                Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
  Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
   ---------------------------------------------------------------------------------------------------------------------
  Composite Emission Factors (g/mi):
```

```
    Composite VOC :      0.303     0.271     0.349     0.293     0.266    0.127     0.150     0.213      3.63     0.301
    Composite CO  :     11.84     11.12     11.35     11.19      7.92     1.205     0.420     1.111     22.96    10.440
    Composite NOX :      0.352     0.383     0.571     0.436     1.613    0.657     0.467     9.063      2.31     1.194
    Composite CO2 :    368.0     478.9     623.9     519.8     895.5    314.0     554.0    1401.9      177.4    559.95
  ------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 35 mph FREEWAY RAMP Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 16.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M515 Warning:
            The combined freeway and ramp average speed entered
            cannot be greater than 34.6 miles per hour.
            The average speed will be reset to this value.
  M582 Warning:
            The user supplied freeway average speed of 34.6
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M112 Warning:
                Wintertime Reformulated Gasoline Rules Apply
```

```
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.374	0.311	0.410	0.339	0.350	0.156	0.184	0.299	3.07	0.357
Composite CO :	13.54	12.19	12.14	12.18	5.57	1.154	0.400	1.026	12.41	11.395
Composite NOX :	0.375	0.395	0.608	0.455	1.305	0.338	0.240	4.065	1.61	0.773
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 Idle Scenario - Winter (multiply g/mi by 2.5 mph to get g/hr), with PM10
* File 1, Run 2, Scenario 17.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV
```

```
* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of  2.5
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
```

```
 Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      2.660     1.917     2.251     2.011     3.340    0.395     0.476     1.037     11.37     2.212
     Composite CO  :     21.61     19.56     20.93     19.95     34.92     3.991     1.489     5.849    100.99    20.086
     Composite NOX :      0.589     0.645     0.974     0.738     0.978    0.660     0.469     8.448      1.48     1.359
     Composite CO2 :    368.0     478.9     623.9     519.8     895.5    314.0     554.0    1401.9      177.4    559.95
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 5 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 18.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of  5.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
```

```
 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
                Minimum Temperature:  35.0 (F)
                Maximum Temperature:  45.0 (F)
                  Absolute Humidity:   75. grains/lb
                Fuel Sulfur Content:   30. ppm

                Exhaust I/M Program:  Yes
                   Evap I/M Program:  Yes
                        ATP Program:  Yes
                   Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.998	0.774	0.995	0.836	1.649	0.355	0.426	0.911	7.78	0.948
Composite CO :	14.80	13.63	14.25	13.80	27.90	3.359	1.247	4.775	60.45	14.016
Composite NOX :	0.524	0.571	0.856	0.651	1.003	0.595	0.423	7.625	1.39	1.221
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 10 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 19.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
```

```
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 10.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
  ---------------------------------------------------------------------------------------------------------------------
```

```
 Composite Emission Factors (g/mi):
     Composite VOC :      0.565     0.458     0.610     0.500     0.988    0.291     0.349     0.715      5.05     0.574
     Composite CO  :     11.66     10.82     11.10     10.90     18.57     2.487     0.912     3.292     31.83    10.834
     Composite NOX :      0.427     0.469     0.705     0.535     1.054    0.496     0.353     6.379      1.32     1.021
     Composite CO2 :    368.0     478.9     623.9     519.8     895.5    314.0     554.0    1401.9      177.4    559.95
   ---------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 15 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 20.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 15.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
```

```
                  Calendar Year:  2012
                          Month:  Jan.
                       Altitude:  Low
             Minimum Temperature:  35.0 (F)
             Maximum Temperature:  45.0 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.455	0.373	0.496	0.408	0.718	0.245	0.293	0.574	4.12	0.462
Composite CO :	10.74	9.96	10.15	10.02	13.05	1.948	0.705	2.376	22.56	9.736
Composite NOX :	0.365	0.403	0.610	0.461	1.105	0.429	0.305	5.528	1.33	0.889
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 20 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 21.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV
```

```
* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 20.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.395     0.329     0.437     0.359     0.554     0.211     0.252     0.471      3.69     0.399
```

```
     Composite CO  :     10.29      9.53      9.68      9.57      9.69     1.606     0.574     1.794     18.29     9.156
     Composite NOX :      0.333     0.370     0.563     0.424     1.156    0.384     0.273     4.957      1.40     0.812
     Composite CO2 :    368.0     478.9     623.9     519.8     895.5    314.0     554.0    1401.9      177.4    559.95
   ------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 25 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 22.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 25.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                           Month:  Jan.
```

```
                  Altitude:  Low
          Minimum Temperature:  35.0 (F)
          Maximum Temperature:  45.0 (F)
            Absolute Humidity:   75. grains/lb
          Fuel Sulfur Content:   30. ppm

          Exhaust I/M Program:  Yes
             Evap I/M Program:  Yes
                  ATP Program:  Yes
             Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.364	0.305	0.404	0.333	0.456	0.187	0.222	0.395	3.42	0.364
Composite CO :	10.03	9.30	9.42	9.33	7.60	1.385	0.489	1.418	15.67	8.822
Composite NOX :	0.315	0.350	0.534	0.402	1.207	0.356	0.252	4.599	1.48	0.766
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 30 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 23.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV
```

```
* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 30.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.345	0.290	0.386	0.317	0.391	0.168	0.199	0.338	3.22	0.341
Composite CO :	9.95	9.23	9.34	9.26	6.30	1.241	0.434	1.173	13.78	8.682
Composite NOX :	0.302	0.337	0.516	0.387	1.257	0.341	0.242	4.412	1.56	0.739

```
     Composite CO2 :    368.0     478.9     623.9     519.8     895.5    314.0     554.0    1401.9      177.4    559.95
  ------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 35 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 24.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 35.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
```

```
             Maximum Temperature:  45.0 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.332	0.281	0.372	0.307	0.347	0.155	0.183	0.297	3.07	0.325
Composite CO :	10.00	9.29	9.40	9.32	5.52	1.148	0.398	1.015	12.37	8.685
Composite NOX :	0.296	0.331	0.508	0.381	1.308	0.338	0.240	4.374	1.61	0.733
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 40 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 25.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
```

```
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 40.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.325     0.278     0.368     0.304     0.317    0.145     0.170     0.266      2.96     0.317
     Composite CO  :     10.31      9.59      9.73      9.63      5.11     1.092     0.376     0.920     11.40     8.928
     Composite NOX :      0.303     0.338     0.516     0.388     1.359    0.346     0.246     4.482      1.65     0.750
     Composite CO2 :    368.0     478.9     623.9     519.8     895.5    314.0     554.0    1401.9      177.4    559.95
  ---------------------------------------------------------------------------------------------------------------------
```

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 45 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 26.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 45.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
```

```
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.320	0.277	0.364	0.301	0.296	0.137	0.162	0.243	2.90	0.312
Composite CO :	10.62	9.90	10.05	9.94	5.00	1.064	0.366	0.872	10.78	9.187
Composite NOX :	0.313	0.347	0.526	0.398	1.410	0.367	0.261	4.748	1.68	0.783
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 50 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 27.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV
```

```
* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 50.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                           Month:  Jan.
                        Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.315     0.275     0.360     0.299     0.281     0.132     0.155     0.228      2.88     0.307
     Composite CO  :     10.92     10.21     10.38     10.25      5.16     1.060     0.364     0.866     10.53     9.462
     Composite NOX :      0.322     0.356     0.537     0.407     1.461     0.403     0.286     5.201      1.77     0.832
     Composite CO2 :    368.0     478.9     623.9     519.8     895.5     314.0     554.0    1401.9     177.4    559.95
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
```

```
* 2012 55 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 28.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 55.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm
```

```
              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.309     0.273     0.356     0.296     0.271    0.129     0.152     0.218      2.88     0.302
     Composite CO  :     11.23     10.51     10.70     10.57      5.63     1.080     0.372     0.899     10.53     9.752
     Composite NOX :      0.332     0.365     0.548     0.416     1.512    0.458     0.325     5.895      1.95     0.902
     Composite CO2 :    368.0     478.9     623.9     519.8     895.5    314.0     554.0    1401.9      177.4    559.95
  ---------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 60 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 29.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
```

```
 M583 Warning:
          The user supplied arterial average speed of 60.0
          will be used for all hours of the day.  100% of VMT
          has been assigned to the arterial/collector roadway
          type for all hours of the day and all vehicle types.
 M112 Warning:
             Wintertime Reformulated Gasoline Rules Apply
 M 48 Warning:
            there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
                 Calendar Year:  2012
                         Month:  Jan.
                      Altitude:  Low
            Minimum Temperature:  35.0 (F)
            Maximum Temperature:  45.0 (F)
              Absolute Humidity:   75. grains/lb
            Fuel Sulfur Content:   30. ppm

            Exhaust I/M Program:  Yes
               Evap I/M Program:  Yes
                    ATP Program:  Yes
               Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.306	0.272	0.352	0.294	0.266	0.127	0.150	0.213	3.25	0.301
Composite CO :	11.53	10.82	11.03	10.88	6.50	1.126	0.389	0.977	16.75	10.084
Composite NOX :	0.342	0.374	0.559	0.426	1.563	0.539	0.383	6.918	2.13	1.001
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 65 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 30.
```

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M582 Warning:
            The user supplied freeway average speed of 65.0
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M112 Warning:
                Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2012
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  35.0 (F)
              Maximum Temperature:  45.0 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
```

```
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
Fuel Economy (mpg):      24.1      18.5      14.2      17.1       9.9      32.4      18.4       7.3      50.0      16.3
 ---------------------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
    Composite VOC :      0.303     0.271     0.349     0.293     0.266    0.127     0.150     0.213      3.63     0.301
    Composite CO  :     11.84     11.12     11.35     11.19      7.92     1.205     0.420     1.111     22.96    10.440
    Composite NOX :      0.352     0.383     0.571     0.436     1.613    0.657     0.467     9.063      2.31     1.194
    Composite CO2 :    368.0     478.9     623.9     519.8     895.5    314.0     554.0    1401.9      177.4    559.95
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 35 mph FREEWAY RAMP Scenario - Winter, with PM10
* File 1, Run 2, Scenario 31.
* # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M515 Warning:
```

```
           The combined freeway and ramp average speed entered
           cannot be greater than 34.6 miles per hour.
           The average speed will be reset to this value.
 M582 Warning:
           The user supplied freeway average speed of 34.6
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
 M112 Warning:
              Wintertime Reformulated Gasoline Rules Apply
 M 48 Warning:
             there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
                  Calendar Year:  2012
                          Month:  Jan.
                       Altitude:  Low
             Minimum Temperature:  35.0 (F)
             Maximum Temperature:  45.0 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.1	9.9	32.4	18.4	7.3	50.0	16.3
Composite Emission Factors (g/mi):										
Composite VOC :	0.374	0.311	0.410	0.339	0.350	0.156	0.184	0.299	3.07	0.357
Composite CO :	13.54	12.19	12.14	12.18	5.57	1.154	0.400	1.026	12.41	11.395
Composite NOX :	0.375	0.395	0.608	0.455	1.305	0.338	0.240	4.065	1.61	0.773
Composite CO2 :	368.0	478.9	623.9	519.8	895.5	314.0	554.0	1401.9	177.4	559.95

```
**********************************************************************
* MOBILE6.2.03 (24-Sep-2003)                                         *
* Input file: MA12PM03.INP (file 1, run 1).                          *
**********************************************************************

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012DEFAULT SPEED - Summer, with PM2.5
* File 1, Run 1, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2012
                                 Month:  July
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff:  2.50 Microns
                         Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
 ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
               Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
              GASPM:    0.0037    0.0035    0.0035    0.0035    0.0195    ------    ------    ------    0.0142    0.0039
            ECARBON:    ------    ------    ------    ------    ------    0.0688    0.0103    0.0631    ------    0.0054
            OCARBON:    ------    ------    ------    ------    ------    0.0194    0.0148    0.0316    ------    0.0027
                SO4:    0.0003    0.0005    0.0005    0.0005    0.0018    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:    0.0040    0.0040    0.0040    0.0040    0.0213    0.0883    0.0253    0.0955    0.0143    0.0125
             Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
              Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
          Total PM:    0.0113    0.0113    0.0113    0.0113    0.0287    0.0957    0.0326    0.1071    0.0206    0.0202
               SO2:    0.0067    0.0088    0.0115    0.0096    0.0162    0.0029    0.0052    0.0131    0.0033    0.0092
               NH3:    0.1011    0.1016    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0925
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012Idle Scenario - Summer (multiply g/mi by 2.5 mph to get g/hr), with PM2.5
* File 1, Run 1, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

```
                          Calendar Year:  2012
                                 Month:  July
            Gasoline Fuel Sulfur Content:   30. ppm
              Diesel Fuel Sulfur Content:   15. ppm
                    Particle Size Cutoff:  2.50 Microns
                       Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Composite Emission Factors (g/mi):										
Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0035	0.0034	0.0034	0.0034	0.0198	------	------	------	0.0142	0.0038
ECARBON:	------	------	------	------	------	0.0688	0.0103	0.0631	------	0.0054
OCARBON:	------	------	------	------	------	0.0194	0.0148	0.0316	------	0.0027
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0040	0.0040	0.0040	0.0040	0.0211	0.0883	0.0253	0.0955	0.0144	0.0126
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0114	0.0114	0.0113	0.0113	0.0286	0.0956	0.0326	0.1071	0.0207	0.0203
SO2:	0.0067	0.0087	0.0115	0.0095	0.0164	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 5 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 3.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2012
                                 Month:  July
            Gasoline Fuel Sulfur Content:   30. ppm
              Diesel Fuel Sulfur Content:   15. ppm
                    Particle Size Cutoff:  2.50 Microns
                       Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC    All Veh
```

GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0035	0.0034	0.0034	0.0034	0.0198	------	------	------	0.0142	0.0038
ECARBON:	------	------	------	------	------	0.0688	0.0103	0.0631	------	0.0054
OCARBON:	------	------	------	------	------	0.0194	0.0148	0.0316	------	0.0027
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0040	0.0040	0.0040	0.0040	0.0211	0.0883	0.0253	0.0955	0.0144	0.0126
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0114	0.0114	0.0113	0.0113	0.0286	0.0956	0.0326	0.1071	0.0207	0.0203
SO2:	0.0067	0.0087	0.0115	0.0095	0.0164	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

* #
* 2012 10 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 4.
* #

Calendar Year: 2012
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 2.50 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0035	0.0034	0.0034	0.0034	0.0198	------	------	------	0.0142	0.0038
ECARBON:	------	------	------	------	------	0.0688	0.0103	0.0631	------	0.0054
OCARBON:	------	------	------	------	------	0.0194	0.0148	0.0316	------	0.0027

SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0040	0.0040	0.0040	0.0040	0.0211	0.0883	0.0253	0.0955	0.0144	0.0126
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0114	0.0114	0.0113	0.0113	0.0286	0.0956	0.0326	0.1071	0.0207	0.0203
SO2:	0.0067	0.0087	0.0115	0.0095	0.0164	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 15 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 5.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2012
                                 Month:  July
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff:  2.50 Microns
                         Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0035	0.0034	0.0034	0.0034	0.0198	------	------	------	0.0142	0.0038
ECARBON:	------	------	------	------	------	0.0688	0.0103	0.0631	------	0.0054
OCARBON:	------	------	------	------	------	0.0194	0.0148	0.0316	------	0.0027
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0040	0.0040	0.0040	0.0040	0.0211	0.0883	0.0253	0.0955	0.0144	0.0126
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0114	0.0114	0.0113	0.0113	0.0286	0.0956	0.0326	0.1071	0.0207	0.0203
SO2:	0.0067	0.0087	0.0115	0.0095	0.0164	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 20 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 6.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2012
                                 Month:  July
            Gasoline Fuel Sulfur Content:   30. ppm
              Diesel Fuel Sulfur Content:   15. ppm
                   Particle Size Cutoff:  2.50 Microns
                      Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
               Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:     0.0035    0.0034    0.0034    0.0034    0.0198    ------    ------    ------    0.0142    0.0038
           ECARBON:     ------    ------    ------    ------    ------    0.0688    0.0103    0.0631    ------    0.0054
           OCARBON:     ------    ------    ------    ------    ------    0.0194    0.0148    0.0316    ------    0.0027
               SO4:     0.0005    0.0006    0.0006    0.0006    0.0013    0.0002    0.0003    0.0009    0.0002    0.0006
   Total Exhaust PM:    0.0040    0.0040    0.0040    0.0040    0.0211    0.0883    0.0253    0.0955    0.0144    0.0126
             Brake:     0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
              Tire:     0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
          Total PM:     0.0114    0.0113    0.0113    0.0113    0.0286    0.0956    0.0326    0.1071    0.0207    0.0203
               SO2:     0.0067    0.0088    0.0115    0.0095    0.0164    0.0029    0.0052    0.0131    0.0033    0.0092
               NH3:     0.1011    0.1015    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0925
 -------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 25 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 7.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2012
                                 Month:  July
            Gasoline Fuel Sulfur Content:   30. ppm
              Diesel Fuel Sulfur Content:   15. ppm
```

```
                    Particle Size Cutoff:  2.50 Microns
                        Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
 ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0036    0.0035    0.0034    0.0035    0.0196    ------    ------    ------    0.0142    0.0038
           ECARBON:    ------    ------    ------    ------    ------    0.0688    0.0103    0.0631    ------    0.0054
           OCARBON:    ------    ------    ------    ------    ------    0.0194    0.0148    0.0316    ------    0.0027
               SO4:    0.0004    0.0005    0.0005    0.0005    0.0015    0.0002    0.0003    0.0009    0.0001    0.0006
  Total Exhaust PM:    0.0040    0.0040    0.0040    0.0040    0.0212    0.0883    0.0253    0.0955    0.0143    0.0126
            Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
             Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
         Total PM:    0.0113    0.0113    0.0113    0.0113    0.0286    0.0956    0.0326    0.1071    0.0207    0.0203
              SO2:    0.0067    0.0088    0.0115    0.0095    0.0163    0.0029    0.0052    0.0131    0.0033    0.0092
              NH3:    0.1011    0.1015    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0925
 ---------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 30 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 8.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2012
                                 Month:  July
            Gasoline Fuel Sulfur Content:   30. ppm
              Diesel Fuel Sulfur Content:   15. ppm
                    Particle Size Cutoff:  2.50 Microns
                        Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
 ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
```

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0195	------	------	------	0.0142	0.0039
ECARBON:	------	------	------	------	------	0.0688	0.0103	0.0631	------	0.0054
OCARBON:	------	------	------	------	------	0.0194	0.0148	0.0316	------	0.0027
SO4:	0.0003	0.0005	0.0005	0.0005	0.0017	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0040	0.0040	0.0040	0.0040	0.0212	0.0883	0.0253	0.0955	0.0143	0.0125
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0113	0.0113	0.0113	0.0113	0.0287	0.0956	0.0326	0.1071	0.0206	0.0202
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 35 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 9.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

Calendar Year: 2012
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 2.50 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0193	------	------	------	0.0142	0.0039
ECARBON:	------	------	------	------	------	0.0688	0.0103	0.0631	------	0.0054
OCARBON:	------	------	------	------	------	0.0194	0.0148	0.0316	------	0.0027
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0040	0.0040	0.0040	0.0213	0.0883	0.0253	0.0955	0.0143	0.0125
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0113	0.0113	0.0113	0.0113	0.0288	0.0956	0.0326	0.1071	0.0206	0.0202

SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 40 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 10.
* # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2012
                                 Month:  July
             Gasoline Fuel Sulfur Content:   30. ppm
               Diesel Fuel Sulfur Content:   15. ppm
                    Particle Size Cutoff:  2.50 Microns
                       Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0193	------	------	------	0.0142	0.0039
ECARBON:	------	------	------	------	------	0.0688	0.0103	0.0631	------	0.0054
OCARBON:	------	------	------	------	------	0.0194	0.0148	0.0316	------	0.0027
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0040	0.0040	0.0040	0.0213	0.0883	0.0253	0.0955	0.0143	0.0125
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0113	0.0113	0.0113	0.0113	0.0288	0.0956	0.0326	0.1071	0.0206	0.0202
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 45 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 11.
* # # # # # # # # # # # # # # # # # # # # # # # #
```

```
                              Calendar Year:  2012
                                     Month:  July
                 Gasoline Fuel Sulfur Content:   30. ppm
                   Diesel Fuel Sulfur Content:   15. ppm
                         Particle Size Cutoff:  2.50 Microns
                             Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:              <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
               Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
              GASPM:    0.0037    0.0035    0.0035    0.0035    0.0193    ------    ------    ------    0.0142    0.0039
            ECARBON:    ------    ------    ------    ------    ------    0.0688    0.0103    0.0631    ------    0.0054
            OCARBON:    ------    ------    ------    ------    ------    0.0194    0.0148    0.0316    ------    0.0027
                SO4:    0.0002    0.0004    0.0004    0.0004    0.0019    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:    0.0039    0.0040    0.0040    0.0040    0.0213    0.0883    0.0253    0.0955    0.0143    0.0125
              Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
               Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
           Total PM:    0.0113    0.0113    0.0113    0.0113    0.0288    0.0956    0.0326    0.1071    0.0206    0.0202
                SO2:    0.0067    0.0088    0.0115    0.0096    0.0162    0.0029    0.0052    0.0131    0.0033    0.0092
                NH3:    0.1011    0.1015    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0925
 -------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 50 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 12.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #

                              Calendar Year:  2012
                                     Month:  July
                 Gasoline Fuel Sulfur Content:   30. ppm
                   Diesel Fuel Sulfur Content:   15. ppm
                         Particle Size Cutoff:  2.50 Microns
                             Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:              <6000     >6000     (All)
```

VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0193	------	------	------	0.0142	0.0039
ECARBON:	------	------	------	------	------	0.0688	0.0103	0.0631	------	0.0054
OCARBON:	------	------	------	------	------	0.0194	0.0148	0.0316	------	0.0027
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0040	0.0040	0.0040	0.0213	0.0883	0.0253	0.0955	0.0143	0.0125
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0113	0.0113	0.0113	0.0113	0.0288	0.0956	0.0326	0.1071	0.0206	0.0202
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

* #
* 2012 55 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 13.
* #

Calendar Year: 2012
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 2.50 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0193	------	------	------	0.0142	0.0039
ECARBON:	------	------	------	------	------	0.0688	0.0103	0.0631	------	0.0054
OCARBON:	------	------	------	------	------	0.0194	0.0148	0.0316	------	0.0027
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005

Total Exhaust PM:	0.0039	0.0040	0.0040	0.0040	0.0213	0.0883	0.0253	0.0955	0.0143	0.0125
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0113	0.0113	0.0113	0.0113	0.0288	0.0956	0.0326	0.1071	0.0206	0.0202
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

* #
* 2012 60 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 14.
* #

Calendar Year:	2012
Month:	July
Gasoline Fuel Sulfur Content:	30. ppm
Diesel Fuel Sulfur Content:	15. ppm
Particle Size Cutoff:	2.50 Microns
Reformulated Gas:	Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0193	------	------	------	0.0142	0.0039
ECARBON:	------	------	------	------	------	0.0688	0.0103	0.0631	------	0.0054
OCARBON:	------	------	------	------	------	0.0194	0.0148	0.0316	------	0.0027
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0040	0.0040	0.0040	0.0213	0.0883	0.0253	0.0955	0.0143	0.0125
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0113	0.0113	0.0113	0.0113	0.0288	0.0956	0.0326	0.1071	0.0206	0.0202
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

* #

```
* 2012 65 mph Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 15.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2012
                                    Month:  July
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                      Particle Size Cutoff:  2.50 Microns
                          Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
-----------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0037    0.0035    0.0035    0.0035    0.0193    ------    ------    ------    0.0142    0.0039
           ECARBON:    ------    ------    ------    ------    ------    0.0688    0.0103    0.0631    ------    0.0054
           OCARBON:    ------    ------    ------    ------    ------    0.0194    0.0148    0.0316    ------    0.0027
               SO4:    0.0002    0.0004    0.0004    0.0004    0.0019    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:    0.0039    0.0040    0.0040    0.0040    0.0213    0.0883    0.0253    0.0955    0.0143    0.0125
             Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
              Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
          Total PM:    0.0113    0.0113    0.0113    0.0113    0.0288    0.0956    0.0326    0.1071    0.0206    0.0202
               SO2:    0.0067    0.0088    0.0115    0.0096    0.0162    0.0029    0.0052    0.0131    0.0033    0.0092
               NH3:    0.1011    0.1015    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0925
-----------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 35 mph FREEWAY RAMP Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 16.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2012
                                    Month:  July
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                      Particle Size Cutoff:  2.50 Microns
```

```
                    Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
            GASPM:    0.0037    0.0035    0.0035    0.0035    0.0193    ------    ------    ------    0.0142    0.0039
          ECARBON:    ------    ------    ------    ------    ------    0.0688    0.0103    0.0631    ------    0.0054
          OCARBON:    ------    ------    ------    ------    ------    0.0194    0.0148    0.0316    ------    0.0027
              SO4:    0.0002    0.0004    0.0004    0.0004    0.0019    0.0002    0.0003    0.0009    0.0001    0.0005
   Total Exhaust PM:    0.0039    0.0040    0.0040    0.0040    0.0213    0.0883    0.0253    0.0955    0.0143    0.0125
            Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
             Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
         Total PM:    0.0113    0.0113    0.0113    0.0113    0.0288    0.0956    0.0326    0.1071    0.0206    0.0202
              SO2:    0.0067    0.0088    0.0115    0.0096    0.0162    0.0029    0.0052    0.0131    0.0033    0.0092
              NH3:    0.1011    0.1015    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0925
 -------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 Idle Scenario - Summer (multiply g/mi by 2.5 mph to get g/hr), with PM10
* File 1, Run 1, Scenario 17.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2012
                                  Month:  July
                Gasoline Fuel Sulfur Content:   30. ppm
                  Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff: 10.00 Microns
                           Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
```

GASPM:	0.0038	0.0037	0.0037	0.0037	0.0220	------	------	------	0.0205	0.0042
ECARBON:	------	------	------	------	------	0.0747	0.0111	0.0685	------	0.0059
OCARBON:	------	------	------	------	------	0.0211	0.0160	0.0343	------	0.0030
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0043	0.0043	0.0043	0.0043	0.0233	0.0960	0.0275	0.1037	0.0207	0.0136
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0249	0.0249	0.0248	0.0249	0.0443	0.1165	0.0480	0.1411	0.0372	0.0356
SO2:	0.0067	0.0087	0.0115	0.0095	0.0164	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

* #
* 2012 5 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 18.
* #

Calendar Year: 2012
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0038	0.0037	0.0037	0.0037	0.0220	------	------	------	0.0205	0.0042
ECARBON:	------	------	------	------	------	0.0747	0.0111	0.0685	------	0.0059
OCARBON:	------	------	------	------	------	0.0211	0.0160	0.0343	------	0.0030
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0043	0.0043	0.0043	0.0043	0.0233	0.0960	0.0275	0.1037	0.0207	0.0136
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0249	0.0249	0.0248	0.0249	0.0443	0.1165	0.0480	0.1411	0.0372	0.0356
SO2:	0.0067	0.0087	0.0115	0.0095	0.0164	0.0029	0.0052	0.0131	0.0033	0.0092

NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

* #
* 2012 10 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 19.
* #

Calendar Year: 2012
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0038	0.0037	0.0037	0.0037	0.0220	------	------	------	0.0205	0.0042
ECARBON:	------	------	------	------	------	0.0747	0.0111	0.0685	------	0.0059
OCARBON:	------	------	------	------	------	0.0211	0.0160	0.0343	------	0.0030
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0043	0.0043	0.0043	0.0043	0.0233	0.0960	0.0275	0.1037	0.0207	0.0136
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0249	0.0249	0.0248	0.0249	0.0443	0.1165	0.0480	0.1411	0.0372	0.0356
SO2:	0.0067	0.0087	0.0115	0.0095	0.0164	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

* #
* 2012 15 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 20.
* #

Calendar Year: 2012

```
                                 Month:  July
                Gasoline Fuel Sulfur Content:   30. ppm
                  Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff: 10.00 Microns
                           Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000
Composite Emission Factors (g/mi):										
Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0038	0.0037	0.0037	0.0037	0.0220	------	------	------	0.0205	0.0042
ECARBON:	------	------	------	------	------	0.0747	0.0111	0.0685	------	0.0059
OCARBON:	------	------	------	------	------	0.0211	0.0160	0.0343	------	0.0030
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0043	0.0043	0.0043	0.0043	0.0233	0.0960	0.0275	0.1037	0.0207	0.0136
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0249	0.0249	0.0248	0.0249	0.0443	0.1165	0.0480	0.1411	0.0372	0.0356
SO2:	0.0067	0.0087	0.0115	0.0095	0.0164	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 20 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 21.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2012
                                   Month:  July
                Gasoline Fuel Sulfur Content:   30. ppm
                  Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff: 10.00 Microns
                           Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						

```
  VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
 -----------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0038    0.0037    0.0037    0.0037    0.0220    ------    ------    ------    0.0205    0.0042
           ECARBON:    ------    ------    ------    ------    ------    0.0747    0.0111    0.0685    ------    0.0059
           OCARBON:    ------    ------    ------    ------    ------    0.0211    0.0160    0.0343    ------    0.0030
               SO4:    0.0005    0.0006    0.0006    0.0006    0.0013    0.0002    0.0003    0.0009    0.0002    0.0006
  Total Exhaust PM:    0.0043    0.0043    0.0043    0.0043    0.0233    0.0960    0.0275    0.1037    0.0207    0.0136
             Brake:    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125
              Tire:    0.0080    0.0080    0.0080    0.0080    0.0085    0.0080    0.0080    0.0248    0.0040    0.0094
          Total PM:    0.0249    0.0249    0.0248    0.0248    0.0443    0.1165    0.0480    0.1411    0.0372    0.0356
               SO2:    0.0067    0.0088    0.0115    0.0095    0.0164    0.0029    0.0052    0.0131    0.0033    0.0092
               NH3:    0.1011    0.1015    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0925
 -----------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 25 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 22.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                               Calendar Year:  2012
                                       Month:  July
                Gasoline Fuel Sulfur Content:   30. ppm
                  Diesel Fuel Sulfur Content:   15. ppm
                        Particle Size Cutoff: 10.00 Microns
                            Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
 -----------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0039    0.0038    0.0037    0.0038    0.0218    ------    ------    ------    0.0205    0.0042
           ECARBON:    ------    ------    ------    ------    ------    0.0747    0.0111    0.0685    ------    0.0059
           OCARBON:    ------    ------    ------    ------    ------    0.0211    0.0160    0.0343    ------    0.0030
               SO4:    0.0004    0.0005    0.0005    0.0005    0.0015    0.0002    0.0003    0.0009    0.0001    0.0006
  Total Exhaust PM:    0.0043    0.0043    0.0043    0.0043    0.0233    0.0960    0.0275    0.1037    0.0206    0.0136
```

Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0248	0.0248	0.0248	0.0248	0.0444	0.1165	0.0480	0.1411	0.0372	0.0356
SO2:	0.0067	0.0088	0.0115	0.0095	0.0163	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

* #
* 2012 30 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 23.
* #

Calendar Year: 2012
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0216	------	------	------	0.0205	0.0042
ECARBON:	------	------	------	------	------	0.0747	0.0111	0.0685	------	0.0059
OCARBON:	------	------	------	------	------	0.0211	0.0160	0.0343	------	0.0030
SO4:	0.0003	0.0005	0.0005	0.0005	0.0017	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0043	0.0043	0.0043	0.0043	0.0234	0.0960	0.0275	0.1037	0.0206	0.0136
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0248	0.0248	0.0248	0.0248	0.0444	0.1165	0.0480	0.1411	0.0371	0.0356
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

* #
* 2012 35 mph Scenario - Summer, with PM10

```
* File 1, Run 1, Scenario 24.
* # # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2012
                                    Month:  July
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff: 10.00 Microns
                         Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:              <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
-----------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0040    0.0038    0.0038    0.0038    0.0215    ------    ------    ------    0.0205    0.0043
           ECARBON:    ------    ------    ------    ------    ------    0.0747    0.0111    0.0685    ------    0.0059
           OCARBON:    ------    ------    ------    ------    ------    0.0211    0.0160    0.0343    ------    0.0030
               SO4:    0.0002    0.0004    0.0004    0.0004    0.0019    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:    0.0042    0.0043    0.0043    0.0043    0.0234    0.0960    0.0275    0.1037    0.0206    0.0136
             Brake:    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125
              Tire:    0.0080    0.0080    0.0080    0.0080    0.0085    0.0080    0.0080    0.0248    0.0040    0.0094
          Total PM:    0.0248    0.0248    0.0248    0.0248    0.0445    0.1165    0.0480    0.1411    0.0371    0.0356
               SO2:    0.0067    0.0088    0.0115    0.0096    0.0162    0.0029    0.0052    0.0131    0.0033    0.0092
               NH3:    0.1011    0.1015    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0925
-----------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 40 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 25.
* # # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2012
                                    Month:  July
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff: 10.00 Microns
                         Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0215	------	------	------	0.0205	0.0043
ECARBON:	------	------	------	------	------	0.0747	0.0111	0.0685	------	0.0059
OCARBON:	------	------	------	------	------	0.0211	0.0160	0.0343	------	0.0030
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0043	0.0043	0.0043	0.0234	0.0960	0.0275	0.1037	0.0206	0.0136
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0248	0.0248	0.0248	0.0248	0.0445	0.1165	0.0480	0.1411	0.0371	0.0356
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

* #
* 2012 45 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 26.
* #

Calendar Year: 2012
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0215	------	------	------	0.0205	0.0043

ECARBON:	------	------	------	------	------	0.0747	0.0111	0.0685	------	0.0059
OCARBON:	------	------	------	------	------	0.0211	0.0160	0.0343	------	0.0030
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0043	0.0043	0.0043	0.0234	0.0960	0.0275	0.1037	0.0206	0.0136
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0248	0.0248	0.0248	0.0248	0.0445	0.1165	0.0480	0.1411	0.0371	0.0356
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

---

* #
* 2012 50 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 27.
* #

Calendar Year: 2012
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0215	------	------	------	0.0205	0.0043
ECARBON:	------	------	------	------	------	0.0747	0.0111	0.0685	------	0.0059
OCARBON:	------	------	------	------	------	0.0211	0.0160	0.0343	------	0.0030
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0043	0.0043	0.0043	0.0234	0.0960	0.0275	0.1037	0.0206	0.0136
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0248	0.0248	0.0248	0.0248	0.0445	0.1165	0.0480	0.1411	0.0371	0.0356
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

```
-----------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 55 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 28.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                              Calendar Year:  2012
                                      Month:  July
               Gasoline Fuel Sulfur Content:   30. ppm
                 Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff: 10.00 Microns
                           Reformulated Gas:  Yes

         Vehicle Type:     LDGV    LDGT12    LDGT34     LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
                 GVWR:              <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
-----------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
                 Lead:   0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
                GASPM:   0.0040    0.0038    0.0038    0.0038    0.0215    ------    ------    ------    0.0205    0.0043
              ECARBON:   ------    ------    ------    ------    ------    0.0747    0.0111    0.0685    ------    0.0059
              OCARBON:   ------    ------    ------    ------    ------    0.0211    0.0160    0.0343    ------    0.0030
                  SO4:   0.0002    0.0004    0.0004    0.0004    0.0019    0.0002    0.0003    0.0009    0.0001    0.0005
     Total Exhaust PM:   0.0042    0.0043    0.0043    0.0043    0.0234    0.0960    0.0275    0.1037    0.0206    0.0136
                Brake:   0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125
                 Tire:   0.0080    0.0080    0.0080    0.0080    0.0085    0.0080    0.0080    0.0248    0.0040    0.0094
             Total PM:   0.0248    0.0248    0.0248    0.0248    0.0445    0.1165    0.0480    0.1411    0.0371    0.0356
                  SO2:   0.0067    0.0088    0.0115    0.0096    0.0162    0.0029    0.0052    0.0131    0.0033    0.0092
                  NH3:   0.1011    0.1015    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0925
-----------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 60 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 29.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                              Calendar Year:  2012
                                      Month:  July
```

```
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff: 10.00 Microns
                         Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
               Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:     0.0040    0.0038    0.0038    0.0038    0.0215    ------    ------    ------    0.0205    0.0043
           ECARBON:     ------    ------    ------    ------    ------    0.0747    0.0111    0.0685    ------    0.0059
           OCARBON:     ------    ------    ------    ------    ------    0.0211    0.0160    0.0343    ------    0.0030
               SO4:     0.0002    0.0004    0.0004    0.0004    0.0019    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:     0.0042    0.0043    0.0043    0.0043    0.0234    0.0960    0.0275    0.1037    0.0206    0.0136
             Brake:     0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125
              Tire:     0.0080    0.0080    0.0080    0.0080    0.0085    0.0080    0.0080    0.0248    0.0040    0.0094
          Total PM:     0.0248    0.0248    0.0248    0.0248    0.0445    0.1165    0.0480    0.1411    0.0371    0.0356
               SO2:     0.0067    0.0088    0.0115    0.0096    0.0162    0.0029    0.0052    0.0131    0.0033    0.0092
               NH3:     0.1011    0.1015    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0925
 -------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 65 mph Scenario - Summer, with PM10
* File 1, Run 1, Scenario 30.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #


                           Calendar Year:  2012
                                   Month:  July
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff: 10.00 Microns
                         Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3071    0.4054    0.1595              0.0369    0.0002    0.0015    0.0857    0.0038    1.0000
```

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0215	------	------	------	0.0205	0.0043
ECARBON:	------	------	------	------	------	0.0747	0.0111	0.0685	------	0.0059
OCARBON:	------	------	------	------	------	0.0211	0.0160	0.0343	------	0.0030
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0043	0.0043	0.0043	0.0234	0.0960	0.0275	0.1037	0.0206	0.0136
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0248	0.0248	0.0248	0.0248	0.0445	0.1165	0.0480	0.1411	0.0371	0.0356
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

* #
* 2012 35 mph FREEWAY RAMP Scenario - Summer, with PM10
* File 1, Run 1, Scenario 31.
* #

Calendar Year: 2012
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3071	0.4054	0.1595		0.0369	0.0002	0.0015	0.0857	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0215	------	------	------	0.0205	0.0043
ECARBON:	------	------	------	------	------	0.0747	0.0111	0.0685	------	0.0059
OCARBON:	------	------	------	------	------	0.0211	0.0160	0.0343	------	0.0030
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0043	0.0043	0.0043	0.0234	0.0960	0.0275	0.1037	0.0206	0.0136
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125

Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0248	0.0248	0.0248	0.0248	0.0445	0.1165	0.0480	0.1411	0.0371	0.0356
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1011	0.1015	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0925

****
* MOBILE6.2.03 (24-Sep-2003) *
* Input file: MA12PM03.INP (file 1, run 2). *
****

* #
* 2012 DEFAULT SPEED - Winter, with PM2.5
* File 1, Run 2, Scenario 1.
* #

Calendar Year:	2012
Month:	Jan.
Gasoline Fuel Sulfur Content:	30. ppm
Diesel Fuel Sulfur Content:	15. ppm
Particle Size Cutoff:	2.50 Microns
Reformulated Gas:	Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0210	------	------	------	0.0142	0.0039
ECARBON:	------	------	------	------	------	0.0688	0.0109	0.0678	------	0.0058
OCARBON:	------	------	------	------	------	0.0194	0.0157	0.0340	------	0.0029
SO4:	0.0003	0.0005	0.0005	0.0005	0.0018	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0040	0.0040	0.0040	0.0040	0.0228	0.0883	0.0268	0.1027	0.0143	0.0132
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0113	0.0113	0.0113	0.0113	0.0303	0.0957	0.0341	0.1142	0.0206	0.0209
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

```
* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 Idle Scenario - Winter (multiply g/mi by 2.5 mph to get g/hr), with PM2.5
* File 1, Run 2, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2012
                                    Month:  Jan.
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                      Particle Size Cutoff:  2.50 Microns
                          Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
 ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0035    0.0034    0.0034    0.0034    0.0214    ------    ------    ------    0.0142    0.0039
           ECARBON:    ------    ------    ------    ------    ------    0.0688    0.0109    0.0678    ------    0.0058
           OCARBON:    ------    ------    ------    ------    ------    0.0194    0.0157    0.0340    ------    0.0029
               SO4:    0.0005    0.0006    0.0006    0.0006    0.0013    0.0002    0.0003    0.0009    0.0002    0.0006
  Total Exhaust PM:    0.0040    0.0040    0.0040    0.0040    0.0226    0.0883    0.0268    0.1027    0.0144    0.0132
             Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
              Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
          Total PM:    0.0114    0.0114    0.0113    0.0114    0.0301    0.0956    0.0341    0.1142    0.0207    0.0209
               SO2:    0.0067    0.0088    0.0115    0.0095    0.0164    0.0029    0.0052    0.0131    0.0033    0.0091
               NH3:    0.1012    0.1016    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0926
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 5 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 3.
* # # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2012
                                    Month:  Jan.
              Gasoline Fuel Sulfur Content:   30. ppm
```

```
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff:  2.50 Microns
                         Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
             GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0035    0.0034    0.0034    0.0034    0.0214    ------    ------    ------    0.0142    0.0039
           ECARBON:    ------    ------    ------    ------    ------    0.0688    0.0109    0.0678    ------    0.0058
           OCARBON:    ------    ------    ------    ------    ------    0.0194    0.0157    0.0340    ------    0.0029
               SO4:    0.0005    0.0006    0.0006    0.0006    0.0013    0.0002    0.0003    0.0009    0.0002    0.0006
   Total Exhaust PM:    0.0040    0.0040    0.0040    0.0040    0.0226    0.0883    0.0268    0.1027    0.0144    0.0132
             Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
              Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
          Total PM:    0.0114    0.0114    0.0113    0.0114    0.0301    0.0956    0.0341    0.1142    0.0207    0.0209
               SO2:    0.0067    0.0088    0.0115    0.0095    0.0164    0.0029    0.0052    0.0131    0.0033    0.0091
               NH3:    0.1012    0.1016    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0926
 -------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 10 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 4.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                           Calendar Year:  2012
                                   Month:  Jan.
                Gasoline Fuel Sulfur Content:   30. ppm
                  Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff:  2.50 Microns
                           Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
             GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
 -------------------------------------------------------------------------------------------------------------------
```

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0035	0.0034	0.0034	0.0034	0.0214	------	------	------	0.0142	0.0039
ECARBON:	------	------	------	------	------	0.0688	0.0109	0.0678	------	0.0058
OCARBON:	------	------	------	------	------	0.0194	0.0157	0.0340	------	0.0029
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0040	0.0040	0.0040	0.0040	0.0226	0.0883	0.0268	0.1027	0.0144	0.0132
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0114	0.0114	0.0113	0.0114	0.0301	0.0956	0.0341	0.1142	0.0207	0.0209
SO2:	0.0067	0.0088	0.0115	0.0095	0.0164	0.0029	0.0052	0.0131	0.0033	0.0091
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

* #
* 2012 15 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 5.
* #

Calendar Year: 2012
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 2.50 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0035	0.0034	0.0034	0.0034	0.0214	------	------	------	0.0142	0.0039
ECARBON:	------	------	------	------	------	0.0688	0.0109	0.0678	------	0.0058
OCARBON:	------	------	------	------	------	0.0194	0.0157	0.0340	------	0.0029
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0040	0.0040	0.0040	0.0040	0.0226	0.0883	0.0268	0.1027	0.0144	0.0132
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024

Total PM:	0.0114	0.0114	0.0113	0.0114	0.0301	0.0956	0.0341	0.1142	0.0207	0.0209
SO2:	0.0067	0.0088	0.0115	0.0095	0.0164	0.0029	0.0052	0.0131	0.0033	0.0091
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

* #
* 2012 20 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 6.
* #

Calendar Year: 2012
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 2.50 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0035	0.0034	0.0034	0.0034	0.0213	------	------	------	0.0142	0.0039
ECARBON:	------	------	------	------	------	0.0688	0.0109	0.0678	------	0.0058
OCARBON:	------	------	------	------	------	0.0194	0.0157	0.0340	------	0.0029
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0040	0.0040	0.0040	0.0040	0.0227	0.0883	0.0268	0.1027	0.0144	0.0132
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0114	0.0114	0.0113	0.0114	0.0301	0.0956	0.0341	0.1142	0.0207	0.0209
SO2:	0.0067	0.0088	0.0115	0.0095	0.0164	0.0029	0.0052	0.0131	0.0033	0.0091
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

* #
* 2012 25 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 7.
* #

```
                          Calendar Year:  2012
                                 Month:  Jan.
            Gasoline Fuel Sulfur Content:   30. ppm
              Diesel Fuel Sulfur Content:   15. ppm
                    Particle Size Cutoff:  2.50 Microns
                       Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
                GVWR:              <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
-------------------------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0036    0.0035    0.0035    0.0035    0.0212    ------    ------    ------    0.0142    0.0039
           ECARBON:    ------    ------    ------    ------    ------    0.0688    0.0109    0.0678    ------    0.0058
           OCARBON:    ------    ------    ------    ------    ------    0.0194    0.0157    0.0340    ------    0.0029
               SO4:    0.0004    0.0005    0.0005    0.0005    0.0015    0.0002    0.0003    0.0009    0.0001    0.0006
  Total Exhaust PM:    0.0040    0.0040    0.0040    0.0040    0.0227    0.0883    0.0268    0.1027    0.0143    0.0132
             Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
              Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
          Total PM:    0.0113    0.0113    0.0113    0.0113    0.0302    0.0956    0.0341    0.1142    0.0207    0.0209
               SO2:    0.0067    0.0088    0.0115    0.0095    0.0163    0.0029    0.0052    0.0131    0.0033    0.0092
               NH3:    0.1012    0.1016    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0926
-------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 30 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 8.
* # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2012
                                 Month:  Jan.
            Gasoline Fuel Sulfur Content:   30. ppm
              Diesel Fuel Sulfur Content:   15. ppm
                    Particle Size Cutoff:  2.50 Microns
                       Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
```

GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0210	------	------	------	0.0142	0.0039
ECARBON:	------	------	------	------	------	0.0688	0.0109	0.0678	------	0.0058
OCARBON:	------	------	------	------	------	0.0194	0.0157	0.0340	------	0.0029
SO4:	0.0003	0.0005	0.0005	0.0005	0.0017	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0040	0.0040	0.0040	0.0040	0.0228	0.0883	0.0268	0.1027	0.0143	0.0132
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0113	0.0113	0.0113	0.0113	0.0302	0.0956	0.0341	0.1142	0.0206	0.0209
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

* #
* 2012 35 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 9.
* #

Calendar Year: 2012
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 2.50 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0209	------	------	------	0.0142	0.0040
ECARBON:	------	------	------	------	------	0.0688	0.0109	0.0678	------	0.0058
OCARBON:	------	------	------	------	------	0.0194	0.0157	0.0340	------	0.0029

SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0040	0.0040	0.0040	0.0228	0.0883	0.0268	0.1027	0.0143	0.0131
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0113	0.0113	0.0113	0.0113	0.0303	0.0956	0.0341	0.1142	0.0206	0.0208
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 40 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 10.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

Calendar Year: 2012
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 2.50 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	---	---	---	---	---	---	---	---	---	---
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0209	------	------	------	0.0142	0.0040
ECARBON:	------	------	------	------	------	0.0688	0.0109	0.0678	------	0.0058
OCARBON:	------	------	------	------	------	0.0194	0.0157	0.0340	------	0.0029
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0040	0.0040	0.0040	0.0228	0.0883	0.0268	0.1027	0.0143	0.0131
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0113	0.0113	0.0113	0.0113	0.0303	0.0956	0.0341	0.1142	0.0206	0.0208
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 45 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 11.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                               Calendar Year:  2012
                                       Month:  Jan.
               Gasoline Fuel Sulfur Content:   30. ppm
                 Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff:  2.50 Microns
                           Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Composite Emission Factors (g/mi):										
Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0209	------	------	------	0.0142	0.0040
ECARBON:	------	------	------	------	------	0.0688	0.0109	0.0678	------	0.0058
OCARBON:	------	------	------	------	------	0.0194	0.0157	0.0340	------	0.0029
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0040	0.0040	0.0040	0.0228	0.0883	0.0268	0.1027	0.0143	0.0131
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0113	0.0113	0.0113	0.0113	0.0303	0.0956	0.0341	0.1142	0.0206	0.0208
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 50 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 12.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                               Calendar Year:  2012
                                       Month:  Jan.
               Gasoline Fuel Sulfur Content:   30. ppm
                 Diesel Fuel Sulfur Content:   15. ppm
```

```
                    Particle Size Cutoff:  2.50 Microns
                        Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
               Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0037    0.0035    0.0035    0.0035    0.0209    ------    ------    ------    0.0142    0.0040
           ECARBON:    ------    ------    ------    ------    ------    0.0688    0.0109    0.0678    ------    0.0058
           OCARBON:    ------    ------    ------    ------    ------    0.0194    0.0157    0.0340    ------    0.0029
               SO4:    0.0002    0.0004    0.0004    0.0004    0.0019    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:    0.0039    0.0040    0.0040    0.0040    0.0228    0.0883    0.0268    0.1027    0.0143    0.0131
             Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
              Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
          Total PM:    0.0113    0.0113    0.0113    0.0113    0.0303    0.0956    0.0341    0.1142    0.0206    0.0208
               SO2:    0.0067    0.0088    0.0115    0.0096    0.0162    0.0029    0.0052    0.0131    0.0033    0.0092
               NH3:    0.1012    0.1016    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0926
 -------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 55 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 13.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2012
                                 Month:  Jan.
             Gasoline Fuel Sulfur Content:   30. ppm
               Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff:  2.50 Microns
                         Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
```

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0209	------	------	------	0.0142	0.0040
ECARBON:	------	------	------	------	------	0.0688	0.0109	0.0678	------	0.0058
OCARBON:	------	------	------	------	------	0.0194	0.0157	0.0340	------	0.0029
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0040	0.0040	0.0040	0.0228	0.0883	0.0268	0.1027	0.0143	0.0131
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0113	0.0113	0.0113	0.0113	0.0303	0.0956	0.0341	0.1142	0.0206	0.0208
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 60 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 14.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

Calendar Year: 2012
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 2.50 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0209	------	------	------	0.0142	0.0040
ECARBON:	------	------	------	------	------	0.0688	0.0109	0.0678	------	0.0058
OCARBON:	------	------	------	------	------	0.0194	0.0157	0.0340	------	0.0029
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0040	0.0040	0.0040	0.0228	0.0883	0.0268	0.1027	0.0143	0.0131
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0113	0.0113	0.0113	0.0113	0.0303	0.0956	0.0341	0.1142	0.0206	0.0208

SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 65 mph Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 15.
* # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2012
                                 Month:  Jan.
            Gasoline Fuel Sulfur Content:   30. ppm
              Diesel Fuel Sulfur Content:   15. ppm
                   Particle Size Cutoff:  2.50 Microns
                      Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000
Composite Emission Factors (g/mi):										
Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0209	------	------	------	0.0142	0.0040
ECARBON:	------	------	------	------	------	0.0688	0.0109	0.0678	------	0.0058
OCARBON:	------	------	------	------	------	0.0194	0.0157	0.0340	------	0.0029
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0040	0.0040	0.0040	0.0228	0.0883	0.0268	0.1027	0.0143	0.0131
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0113	0.0113	0.0113	0.0113	0.0303	0.0956	0.0341	0.1142	0.0206	0.0208
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 35 mph FREEWAY RAMP Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 16.
* # # # # # # # # # # # # # # # # # # # # # # # #
```

```
                          Calendar Year:  2012
                                 Month:  Jan.
          Gasoline Fuel Sulfur Content:   30. ppm
            Diesel Fuel Sulfur Content:   15. ppm
                 Particle Size Cutoff:  2.50 Microns
                     Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
 -------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0037    0.0035    0.0035    0.0035    0.0209    ------    ------    ------    0.0142    0.0040
           ECARBON:    ------    ------    ------    ------    ------    0.0688    0.0109    0.0678    ------    0.0058
           OCARBON:    ------    ------    ------    ------    ------    0.0194    0.0157    0.0340    ------    0.0029
               SO4:    0.0002    0.0004    0.0004    0.0004    0.0019    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:    0.0039    0.0040    0.0040    0.0040    0.0228    0.0883    0.0268    0.1027    0.0143    0.0131
             Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
              Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
          Total PM:    0.0113    0.0113    0.0113    0.0113    0.0303    0.0956    0.0341    0.1142    0.0206    0.0208
               SO2:    0.0067    0.0088    0.0115    0.0096    0.0162    0.0029    0.0052    0.0131    0.0033    0.0092
               NH3:    0.1012    0.1016    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0926
 -------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 Idle Scenario - Winter (multiply g/mi by 2.5 mph to get g/hr), with PM10
* File 1, Run 2, Scenario 17.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2012
                                 Month:  Jan.
          Gasoline Fuel Sulfur Content:   30. ppm
            Diesel Fuel Sulfur Content:   15. ppm
                 Particle Size Cutoff: 10.00 Microns
                     Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
```

VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0038	0.0037	0.0037	0.0037	0.0237	------	------	------	0.0205	0.0042
ECARBON:	------	------	------	------	------	0.0747	0.0118	0.0737	------	0.0063
OCARBON:	------	------	------	------	------	0.0211	0.0170	0.0369	------	0.0032
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0043	0.0043	0.0043	0.0043	0.0250	0.0960	0.0291	0.1115	0.0207	0.0143
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0249	0.0249	0.0249	0.0249	0.0460	0.1165	0.0497	0.1489	0.0372	0.0363
SO2:	0.0067	0.0088	0.0115	0.0095	0.0164	0.0029	0.0052	0.0131	0.0033	0.0091
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

* #
* 2012 5 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 18.
* #

Calendar Year: 2012
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0038	0.0037	0.0037	0.0037	0.0237	------	------	------	0.0205	0.0042
ECARBON:	------	------	------	------	------	0.0747	0.0118	0.0737	------	0.0063
OCARBON:	------	------	------	------	------	0.0211	0.0170	0.0369	------	0.0032
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006

Total Exhaust PM:	0.0043	0.0043	0.0043	0.0043	0.0250	0.0960	0.0291	0.1115	0.0207	0.0143
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0249	0.0249	0.0249	0.0249	0.0460	0.1165	0.0497	0.1489	0.0372	0.0363
SO2:	0.0067	0.0088	0.0115	0.0095	0.0164	0.0029	0.0052	0.0131	0.0033	0.0091
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

* #
* 2012 10 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 19.
* #

Calendar Year: 2012
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0038	0.0037	0.0037	0.0037	0.0237	------	------	------	0.0205	0.0042
ECARBON:	------	------	------	------	------	0.0747	0.0118	0.0737	------	0.0063
OCARBON:	------	------	------	------	------	0.0211	0.0170	0.0369	------	0.0032
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0043	0.0043	0.0043	0.0043	0.0250	0.0960	0.0291	0.1115	0.0207	0.0143
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0249	0.0249	0.0249	0.0249	0.0460	0.1165	0.0497	0.1489	0.0372	0.0363
SO2:	0.0067	0.0088	0.0115	0.0095	0.0164	0.0029	0.0052	0.0131	0.0033	0.0091
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

* #

```
* 2012 15 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 20.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2012
                                    Month:  Jan.
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                      Particle Size Cutoff: 10.00 Microns
                          Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
-------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0038    0.0037    0.0037    0.0037    0.0237    ------    ------    ------    0.0205    0.0042
           ECARBON:    ------    ------    ------    ------    ------    0.0747    0.0118    0.0737    ------    0.0063
           OCARBON:    ------    ------    ------    ------    ------    0.0211    0.0170    0.0369    ------    0.0032
               SO4:    0.0005    0.0006    0.0006    0.0006    0.0013    0.0002    0.0003    0.0009    0.0002    0.0006
  Total Exhaust PM:    0.0043    0.0043    0.0043    0.0043    0.0250    0.0960    0.0291    0.1115    0.0207    0.0143
             Brake:    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125
              Tire:    0.0080    0.0080    0.0080    0.0080    0.0085    0.0080    0.0080    0.0248    0.0040    0.0094
          Total PM:    0.0249    0.0249    0.0249    0.0249    0.0460    0.1165    0.0497    0.1489    0.0372    0.0363
               SO2:    0.0067    0.0088    0.0115    0.0095    0.0164    0.0029    0.0052    0.0131    0.0033    0.0091
               NH3:    0.1012    0.1016    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0926
-------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 20 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 21.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2012
                                    Month:  Jan.
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                      Particle Size Cutoff: 10.00 Microns
```

```
                    Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
             GVWR:                 <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
            GASPM:    0.0038    0.0037    0.0037    0.0037    0.0237    ------    ------    ------    0.0205    0.0042
          ECARBON:    ------    ------    ------    ------    ------    0.0747    0.0118    0.0737    ------    0.0063
          OCARBON:    ------    ------    ------    ------    ------    0.0211    0.0170    0.0369    ------    0.0032
              SO4:    0.0005    0.0006    0.0006    0.0006    0.0013    0.0002    0.0003    0.0009    0.0002    0.0006
   Total Exhaust PM:    0.0043    0.0043    0.0043    0.0043    0.0250    0.0960    0.0291    0.1115    0.0207    0.0143
            Brake:    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125
             Tire:    0.0080    0.0080    0.0080    0.0080    0.0085    0.0080    0.0080    0.0248    0.0040    0.0094
         Total PM:    0.0249    0.0249    0.0249    0.0249    0.0461    0.1165    0.0497    0.1489    0.0372    0.0363
              SO2:    0.0067    0.0088    0.0115    0.0095    0.0164    0.0029    0.0052    0.0131    0.0033    0.0091
              NH3:    0.1012    0.1016    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0926
 -------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 25 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 22.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2012
                                  Month:  Jan.
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff: 10.00 Microns
                         Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
             GVWR:                 <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
```

GASPM:	0.0039	0.0038	0.0038	0.0038	0.0235	------	------	------	0.0205	0.0043
ECARBON:	------	------	------	------	------	0.0747	0.0118	0.0737	------	0.0063
OCARBON:	------	------	------	------	------	0.0211	0.0170	0.0369	------	0.0032
SO4:	0.0004	0.0005	0.0005	0.0005	0.0015	0.0002	0.0003	0.0009	0.0001	0.0006
Total Exhaust PM:	0.0043	0.0043	0.0043	0.0043	0.0250	0.0960	0.0291	0.1115	0.0206	0.0143
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0248	0.0249	0.0248	0.0248	0.0461	0.1165	0.0497	0.1489	0.0372	0.0363
SO2:	0.0067	0.0088	0.0115	0.0095	0.0163	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 30 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 23.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

Calendar Year: 2012
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0233	------	------	------	0.0205	0.0043
ECARBON:	------	------	------	------	------	0.0747	0.0118	0.0737	------	0.0063
OCARBON:	------	------	------	------	------	0.0211	0.0170	0.0369	------	0.0032
SO4:	0.0003	0.0005	0.0005	0.0005	0.0017	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0043	0.0043	0.0043	0.0043	0.0251	0.0960	0.0291	0.1115	0.0206	0.0143
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0248	0.0248	0.0248	0.0248	0.0462	0.1165	0.0497	0.1489	0.0371	0.0363
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092

NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 35 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 24.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2012
                                 Month:  Jan.
             Gasoline Fuel Sulfur Content:   30. ppm
               Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff: 10.00 Microns
                         Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0039	0.0038	0.0038	0.0232	------	------	------	0.0205	0.0043
ECARBON:	------	------	------	------	------	0.0747	0.0118	0.0737	------	0.0063
OCARBON:	------	------	------	------	------	0.0211	0.0170	0.0369	------	0.0032
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0043	0.0043	0.0043	0.0251	0.0960	0.0291	0.1115	0.0206	0.0143
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0248	0.0248	0.0248	0.0248	0.0462	0.1165	0.0497	0.1489	0.0371	0.0363
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 40 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 25.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2012
```

```
                                 Month:  Jan.
               Gasoline Fuel Sulfur Content:   30. ppm
                 Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff: 10.00 Microns
                          Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
-------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
               Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:     0.0040    0.0039    0.0038    0.0038    0.0232    ------    ------    ------    0.0205    0.0043
           ECARBON:     ------    ------    ------    ------    ------    0.0747    0.0118    0.0737    ------    0.0063
           OCARBON:     ------    ------    ------    ------    ------    0.0211    0.0170    0.0369    ------    0.0032
               SO4:     0.0002    0.0004    0.0004    0.0004    0.0019    0.0002    0.0003    0.0009    0.0001    0.0005
   Total Exhaust PM:    0.0042    0.0043    0.0043    0.0043    0.0251    0.0960    0.0291    0.1115    0.0206    0.0143
             Brake:     0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125
              Tire:     0.0080    0.0080    0.0080    0.0080    0.0085    0.0080    0.0080    0.0248    0.0040    0.0094
          Total PM:     0.0248    0.0248    0.0248    0.0248    0.0462    0.1165    0.0497    0.1489    0.0371    0.0363
               SO2:     0.0067    0.0088    0.0115    0.0096    0.0162    0.0029    0.0052    0.0131    0.0033    0.0092
               NH3:     0.1012    0.1016    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0926
-------------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 45 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 26.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2012
                                   Month:  Jan.
               Gasoline Fuel Sulfur Content:   30. ppm
                 Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff: 10.00 Microns
                          Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
```

VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0039	0.0038	0.0038	0.0232	------	------	------	0.0205	0.0043
ECARBON:	------	------	------	------	------	0.0747	0.0118	0.0737	------	0.0063
OCARBON:	------	------	------	------	------	0.0211	0.0170	0.0369	------	0.0032
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0043	0.0043	0.0043	0.0251	0.0960	0.0291	0.1115	0.0206	0.0143
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0248	0.0248	0.0248	0.0248	0.0462	0.1165	0.0497	0.1489	0.0371	0.0363
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 50 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 27.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

Calendar Year: 2012
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0039	0.0038	0.0038	0.0232	------	------	------	0.0205	0.0043
ECARBON:	------	------	------	------	------	0.0747	0.0118	0.0737	------	0.0063
OCARBON:	------	------	------	------	------	0.0211	0.0170	0.0369	------	0.0032
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0043	0.0043	0.0043	0.0251	0.0960	0.0291	0.1115	0.0206	0.0143

Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0248	0.0248	0.0248	0.0248	0.0462	0.1165	0.0497	0.1489	0.0371	0.0363
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

* #
* 2012 55 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 28.
* #

Calendar Year: 2012
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0039	0.0038	0.0038	0.0232	------	------	------	0.0205	0.0043
ECARBON:	------	------	------	------	------	0.0747	0.0118	0.0737	------	0.0063
OCARBON:	------	------	------	------	------	0.0211	0.0170	0.0369	------	0.0032
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0043	0.0043	0.0043	0.0251	0.0960	0.0291	0.1115	0.0206	0.0143
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0248	0.0248	0.0248	0.0248	0.0462	0.1165	0.0497	0.1489	0.0371	0.0363
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

* #
* 2012 60 mph Scenario - Winter, with PM10

```
* File 1, Run 2, Scenario 29.
* # # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2012
                                    Month:  Jan.
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff: 10.00 Microns
                         Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:              <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.3121    0.4027    0.1582              0.0364    0.0002    0.0015    0.0852    0.0038    1.0000
-------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0040    0.0039    0.0038    0.0038    0.0232    ------    ------    ------    0.0205    0.0043
           ECARBON:    ------    ------    ------    ------    ------    0.0747    0.0118    0.0737    ------    0.0063
           OCARBON:    ------    ------    ------    ------    ------    0.0211    0.0170    0.0369    ------    0.0032
               SO4:    0.0002    0.0004    0.0004    0.0004    0.0019    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:    0.0042    0.0043    0.0043    0.0043    0.0251    0.0960    0.0291    0.1115    0.0206    0.0143
             Brake:    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125
              Tire:    0.0080    0.0080    0.0080    0.0080    0.0085    0.0080    0.0080    0.0248    0.0040    0.0094
          Total PM:    0.0248    0.0248    0.0248    0.0248    0.0462    0.1165    0.0497    0.1489    0.0371    0.0363
               SO2:    0.0067    0.0088    0.0115    0.0096    0.0162    0.0029    0.0052    0.0131    0.0033    0.0092
               NH3:    0.1012    0.1016    0.1017    0.1016    0.0451    0.0068    0.0068    0.0270    0.0113    0.0926
-------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2012 65 mph Scenario - Winter, with PM10
* File 1, Run 2, Scenario 30.
* # # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2012
                                    Month:  Jan.
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff: 10.00 Microns
                         Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0039	0.0038	0.0038	0.0232	------	------	------	0.0205	0.0043
ECARBON:	------	------	------	------	------	0.0747	0.0118	0.0737	------	0.0063
OCARBON:	------	------	------	------	------	0.0211	0.0170	0.0369	------	0.0032
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0043	0.0043	0.0043	0.0251	0.0960	0.0291	0.1115	0.0206	0.0143
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0248	0.0248	0.0248	0.0248	0.0462	0.1165	0.0497	0.1489	0.0371	0.0363
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

* #
* 2012 35 mph FREEWAY RAMP Scenario - Winter, with PM10
* File 1, Run 2, Scenario 31.
* #

Calendar Year: 2012
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.3121	0.4027	0.1582		0.0364	0.0002	0.0015	0.0852	0.0038	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0039	0.0038	0.0038	0.0232	------	------	------	0.0205	0.0043

ECARBON:	------	------	------	------	------	0.0747	0.0118	0.0737	------	0.0063
OCARBON:	------	------	------	------	------	0.0211	0.0170	0.0369	------	0.0032
SO4:	0.0002	0.0004	0.0004	0.0004	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0043	0.0043	0.0043	0.0251	0.0960	0.0291	0.1115	0.0206	0.0143
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0094
Total PM:	0.0248	0.0248	0.0248	0.0248	0.0462	0.1165	0.0497	0.1489	0.0371	0.0363
SO2:	0.0067	0.0088	0.0115	0.0096	0.0162	0.0029	0.0052	0.0131	0.0033	0.0092
NH3:	0.1012	0.1016	0.1017	0.1016	0.0451	0.0068	0.0068	0.0270	0.0113	0.0926

```
**************************************************************************
* MOBILE6.2.03 (24-Sep-2003)                                             *
* Input file: MA22_ALL.INP (file 1, run 1).                              *
**************************************************************************
* *** Summer 2022 ***

* Reading Registration Distributions from the following external
* data file: 2005_REG.D
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.999     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.999     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)

* Reading I/M program description records from the following external
* data file: 09NEWIM.D
* 15 Year Exemption Age
```

```
* New Annual OBD Exhaust I/M program for Light Duty MY 1996 through 2007 vehicles <=8,500 lb GVWR
* New Annual OBD Exhaust I/M program for Light Duty and Medium duty MY 2008 and later <=14,000 lb GVWR
* New Annual OBD Evap I/M program for Light Duty MY 1996 through 2007 vehicles <=8,500 lb GVWR
* New Annual OBD Evap I/M program for for Light Duty and Medium duty MY 2008 and later <=14,000 lb GVWR
  M601 Comment:
               User has enabled STAGE II REFUELING.



* Reading 94+ LEV IMPLEMENTATION SCHEDULE from the following external
* data file: MA_LEV2.D

  Reading User Supplied Tier2 Exhaust bin phase-in fractions

     Data read from file: LEV2EXH.D


  Reading User Supplied Tier2 EVAP phase-in fractions

     Data read from file: LEV2EVAP.D


  Reading User Supplied Tier2 50K certification standards

     Data read from file: LEV2CERT.D

  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M614 Comment:
               User supplied diesel sale fractions.

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 DEFAULT SPEED - Summer, with PM2.5
* File 1, Run 1, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV
```

```
* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
*** I/M credits for Tech1&2 vehicles were read from the following external
    data file: TECH12.D
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
 HDDV DEFEAT DEVICE EFFECTS ARE PRESENT. THE REBUILD FRACTION IS 0.10.

* Reading Ammonia (NH3) Basic Emissiion Rates
* from the external data file PMNH3BER.D

* Reading Ammonia (NH3) Sulfur Deterioration Rates
* from the external data file PMNH3SDR.D

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC    All Veh
               GVWR:                <6000     >6000     (All)
```

VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0

Composite Emission Factors (g/mi):

Composite VOC :	0.191	0.188	0.218	0.196	0.211	0.289	0.068	0.251	3.20	0.211
Composite CO :	3.59	3.72	3.89	3.76	5.46	2.035	0.297	0.365	17.10	3.530
Composite NOX :	0.127	0.133	0.182	0.147	0.277	0.564	0.051	1.086	1.26	0.231
Composite CO2 :	368.0	479.4	624.6	520.4	894.5	314.1	552.3	1398.6	177.4	569.43

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 Idle Scenario - Summer (multiply g/mi by 2.5 mph to get g/hr), with PM2.5
* File 1, Run 1, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of  2.5
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
```

```
 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
                Minimum Temperature:  70.4 (F)
                Maximum Temperature:  93.7 (F)
                  Absolute Humidity:   75. grains/lb
                Fuel Sulfur Content:   30. ppm

                Exhaust I/M Program:  Yes
                   Evap I/M Program:  Yes
                        ATP Program:  No
                   Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	1.607	1.364	1.423	1.381	1.650	0.612	0.174	0.776	11.50	1.432
Composite CO :	10.44	9.34	9.75	9.45	25.30	5.183	1.013	1.617	120.29	10.017
Composite NOX :	0.322	0.268	0.370	0.297	0.203	0.903	0.082	1.719	1.12	0.426
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (5 mph), with PM2.5
* File 1, Run 1, Scenario 3.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
```

```
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of  5.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
  Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
   ---------------------------------------------------------------------------------------------------------------------
  Composite Emission Factors (g/mi):
      Composite VOC :      0.574     0.534     0.594     0.551     0.753     0.554     0.155     0.682      7.77     0.601
```

```
     Composite CO  :      6.25      6.00      6.26      6.07     20.22     4.436     0.843     1.320     71.17     6.467
     Composite NOX :      0.267     0.233     0.320     0.258     0.208    0.815     0.074     1.549      1.05     0.373
     Composite CO2 :    368.0     479.4     624.5     520.4     894.4    314.1     552.3    1398.5      177.4    569.38
   ------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (10 mph), with PM2.5
* File 1, Run 1, Scenario 4.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 10.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                           Month:  July
                        Altitude:  Low
              Minimum Temperature:  70.4 (F)
```

```
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.313	0.306	0.351	0.318	0.447	0.464	0.126	0.536	4.94	0.357
Composite CO :	4.30	4.37	4.56	4.43	13.45	3.406	0.609	0.910	36.49	4.538
Composite NOX :	0.202	0.186	0.257	0.206	0.219	0.682	0.062	1.291	1.00	0.302
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (15 mph), with PM2.5
* File 1, Run 1, Scenario 5.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
```

```
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 15.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                           Month:  July
                        Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.250     0.243     0.279     0.253     0.336     0.399     0.104     0.430      3.98     0.284
     Composite CO  :      3.72      3.81      3.98      3.86      9.45     2.769     0.464     0.657     25.25     3.829
     Composite NOX :      0.163     0.157     0.217     0.174     0.229     0.592     0.053     1.115      1.01     0.258
     Composite CO2 :    368.0     479.4     624.5     520.4     894.4    314.1     552.3    1398.5      177.4    569.38
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # #
```

```
* 2022 - Summer (20 mph), with PM2.5
* File 1, Run 1, Scenario 6.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 20.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
```

```
                    ATP Program:  No
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
 ---------------------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
    Composite VOC :      0.214     0.204     0.237     0.214     0.267     0.352     0.089     0.353      3.53     0.240
    Composite CO  :      3.36      3.48      3.64      3.52      7.02      2.365     0.372     0.496     20.08     3.405
    Composite NOX :      0.143     0.142     0.197     0.158     0.240     0.531     0.048     0.997      1.06     0.233
    Composite CO2 :    368.0     479.4     624.5     520.4     894.4     314.1     552.3    1398.5      177.4    569.38
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (25 mph), with PM2.5
* File 1, Run 1, Scenario 7.
* # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 25.0
```

```
           will be used for all hours of the day.  100% of VMT
           has been assigned to the arterial/collector roadway
           type for all hours of the day and all vehicle types.
 M 48 Warning:
             there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
                  Calendar Year:  2022
                          Month:  July
                       Altitude:  Low
             Minimum Temperature:  70.4 (F)
             Maximum Temperature:  93.7 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  No
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.195	0.187	0.217	0.196	0.226	0.317	0.077	0.296	3.26	0.216
Composite CO :	3.19	3.32	3.47	3.36	5.51	2.104	0.313	0.392	16.91	3.188
Composite NOX :	0.131	0.133	0.185	0.148	0.250	0.493	0.044	0.922	1.12	0.218
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (30 mph), with PM2.5
* File 1, Run 1, Scenario 8.
* # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV
```

```
* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 30.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
```

VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0

Composite Emission Factors (g/mi):

Composite VOC :	0.182	0.175	0.205	0.184	0.198	0.291	0.069	0.254	3.05	0.200
Composite CO :	3.14	3.27	3.43	3.32	4.57	1.933	0.274	0.324	14.61	3.097
Composite NOX :	0.123	0.127	0.176	0.141	0.261	0.473	0.042	0.884	1.17	0.209
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (35 mph), with PM2.5
* File 1, Run 1, Scenario 9.
* # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 35.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
```

```
 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
                Minimum Temperature:  70.4 (F)
                Maximum Temperature:  93.7 (F)
                  Absolute Humidity:   75. grains/lb
                Fuel Sulfur Content:   30. ppm

                Exhaust I/M Program:  Yes
                   Evap I/M Program:  Yes
                        ATP Program:  No
                   Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.172	0.167	0.196	0.175	0.179	0.272	0.062	0.222	2.89	0.188
Composite CO :	3.17	3.30	3.46	3.35	4.00	1.824	0.249	0.281	12.91	3.089
Composite NOX :	0.117	0.124	0.172	0.138	0.271	0.469	0.042	0.876	1.22	0.205
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (40 mph), with PM2.5
* File 1, Run 1, Scenario 10.
* # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV
```

```
* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 40.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
  Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
  ---------------------------------------------------------------------------------------------------------------------
  Composite Emission Factors (g/mi):
      Composite VOC :      0.165     0.163     0.191     0.171     0.164     0.257     0.058     0.199      2.78     0.181
      Composite CO  :      3.34      3.49      3.65      3.54      3.70     1.757     0.234     0.254     11.73     3.233
```

```
     Composite NOX :      0.118     0.126     0.175     0.140     0.282     0.480     0.043     0.898      1.24     0.209
     Composite CO2 :    368.0     479.4     624.5     520.4     894.4     314.1     552.3    1398.5      177.4    569.38
   ---------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (45 mph), with PM2.5
* File 1, Run 1, Scenario 11.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
             The user supplied arterial average speed of 45.0
             will be used for all hours of the day.  100% of VMT
             has been assigned to the arterial/collector roadway
             type for all hours of the day and all vehicle types.
  M 48 Warning:
               there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                     Calendar Year:  2022
                             Month:  July
                          Altitude:  Low
               Minimum Temperature:  70.4 (F)
               Maximum Temperature:  93.7 (F)
```

```
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  No
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.159	0.159	0.187	0.167	0.153	0.247	0.054	0.182	2.72	0.175
Composite CO :	3.52	3.68	3.85	3.73	3.62	1.724	0.226	0.241	10.99	3.389
Composite NOX :	0.120	0.129	0.178	0.143	0.292	0.509	0.046	0.953	1.27	0.216
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (50 mph), with PM2.5
* File 1, Run 1, Scenario 12.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV
```

```
* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 50.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.153	0.156	0.184	0.164	0.145	0.240	0.052	0.171	2.69	0.170
Composite CO :	3.71	3.87	4.05	3.92	3.74	1.720	0.225	0.239	10.68	3.557
Composite NOX :	0.121	0.132	0.182	0.146	0.303	0.557	0.050	1.047	1.34	0.228
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (55 mph), with PM2.5
```

```
* File 1, Run 1, Scenario 13.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 55.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
```

Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.150	0.154	0.182	0.162	0.140	0.235	0.051	0.163	2.69	0.167
Composite CO :	3.89	4.06	4.25	4.11	4.08	1.743	0.230	0.249	10.68	3.736
Composite NOX :	0.123	0.135	0.186	0.149	0.313	0.631	0.057	1.191	1.47	0.243
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (60 mph), with PM2.5
* File 1, Run 1, Scenario 14.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 60.0
            will be used for all hours of the day.  100% of VMT
```

```
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                           Month:  July
                        Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.147	0.153	0.181	0.161	0.137	0.233	0.050	0.160	3.08	0.167
Composite CO :	4.07	4.25	4.45	4.31	4.71	1.797	0.243	0.270	18.21	3.957
Composite NOX :	0.124	0.138	0.190	0.153	0.324	0.740	0.067	1.402	1.60	0.265
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (65 mph), with PM2.5
* File 1, Run 1, Scenario 15.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV
```

```
* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 65.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
```

```
 Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.145     0.152     0.181     0.160     0.136    0.233     0.050     0.160      3.47     0.167
     Composite CO  :      4.26      4.45      4.65      4.51      5.73     1.890     0.264     0.307     25.74     4.196
     Composite NOX :      0.126     0.141     0.194     0.156     0.335    0.898     0.082     1.712      1.73     0.295
     Composite CO2 :    368.0     479.4     624.5     520.4     894.4    314.1     552.3    1398.5      177.4    569.38
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 35 mph FREEWAY RAMP Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 16.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M515 Warning:
            The combined freeway and ramp average speed entered
            cannot be greater than 34.6 miles per hour.
            The average speed will be reset to this value.
  M582 Warning:
            The user supplied freeway average speed of 34.6
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
```

```
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                   Calendar Year:  2022
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.4 (F)
             Maximum Temperature:  93.7 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  No
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.184	0.178	0.212	0.188	0.180	0.273	0.063	0.224	2.90	0.199
Composite CO :	4.87	4.88	5.03	4.92	4.04	1.831	0.251	0.284	12.96	4.496
Composite NOX :	0.134	0.149	0.227	0.171	0.270	0.469	0.042	0.842	1.22	0.226
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 DEFAULT SPEED - Summer, with PM10
* File 1, Run 1, Scenario 17.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
```

```
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.191     0.188     0.218     0.196     0.211     0.289     0.068     0.251      3.20     0.211
     Composite CO  :      3.59      3.72      3.89      3.76      5.46     2.035     0.297     0.365     17.10     3.530
     Composite NOX :      0.127     0.133     0.182     0.147     0.277     0.564     0.051     1.086      1.26     0.231
```

```
     Composite CO2 :    368.0     479.4     624.6     520.4     894.5    314.1     552.3    1398.6      177.4    569.43
  ------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 Idle Scenario - Summer (multiply g/mi by 2.5 mph to get g/hr), with PM10
* File 1, Run 1, Scenario 18.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of  2.5
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
```

```
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	1.607	1.364	1.423	1.381	1.650	0.612	0.174	0.776	11.50	1.432
Composite CO :	10.44	9.34	9.75	9.45	25.30	5.183	1.013	1.617	120.29	10.017
Composite NOX :	0.322	0.268	0.370	0.297	0.203	0.903	0.082	1.719	1.12	0.426
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (5 mph), with PM10
* File 1, Run 1, Scenario 19.
* # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV
```

```
* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of  5.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                           Month:  July
                        Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
  Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
   ---------------------------------------------------------------------------------------------------------------------
  Composite Emission Factors (g/mi):
      Composite VOC :      0.574     0.534     0.594     0.551     0.753    0.554     0.155     0.682      7.77     0.601
      Composite CO  :      6.25      6.00      6.26      6.07     20.22     4.436     0.843     1.320     71.17     6.467
      Composite NOX :      0.267     0.233     0.320     0.258     0.208    0.815     0.074     1.549      1.05     0.373
      Composite CO2 :    368.0     479.4     624.5     520.4     894.4    314.1     552.3    1398.5      177.4    569.38
   ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (10 mph), with PM10
* File 1, Run 1, Scenario 20.
```

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 10.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.313	0.306	0.351	0.318	0.447	0.464	0.126	0.536	4.94	0.357
Composite CO :	4.30	4.37	4.56	4.43	13.45	3.406	0.609	0.910	36.49	4.538
Composite NOX :	0.202	0.186	0.257	0.206	0.219	0.682	0.062	1.291	1.00	0.302
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (15 mph), with PM10
* File 1, Run 1, Scenario 21.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 15.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
```

```
           type for all hours of the day and all vehicle types.
 M 48 Warning:
             there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
                  Calendar Year:  2022
                          Month:  July
                       Altitude:  Low
             Minimum Temperature:  70.4 (F)
             Maximum Temperature:  93.7 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  No
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.250	0.243	0.279	0.253	0.336	0.399	0.104	0.430	3.98	0.284
Composite CO :	3.72	3.81	3.98	3.86	9.45	2.769	0.464	0.657	25.25	3.829
Composite NOX :	0.163	0.157	0.217	0.174	0.229	0.592	0.053	1.115	1.01	0.258
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (20 mph), with PM10
* File 1, Run 1, Scenario 22.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
```

```
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 20.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
  Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
```

```
  ------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.214     0.204     0.237     0.214     0.267    0.352     0.089     0.353      3.53     0.240
     Composite CO  :      3.36      3.48      3.64      3.52      7.02     2.365     0.372     0.496     20.08     3.405
     Composite NOX :      0.143     0.142     0.197     0.158     0.240    0.531     0.048     0.997      1.06     0.233
     Composite CO2 :    368.0     479.4     624.5     520.4     894.4    314.1     552.3    1398.5      177.4    569.38
  ------------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (25 mph), with PM10
* File 1, Run 1, Scenario 23.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 25.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
```

```
                     Month:  July
                  Altitude:  Low
          Minimum Temperature:  70.4 (F)
          Maximum Temperature:  93.7 (F)
            Absolute Humidity:   75. grains/lb
          Fuel Sulfur Content:   30. ppm

          Exhaust I/M Program:  Yes
             Evap I/M Program:  Yes
                  ATP Program:  No
             Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.195	0.187	0.217	0.196	0.226	0.317	0.077	0.296	3.26	0.216
Composite CO :	3.19	3.32	3.47	3.36	5.51	2.104	0.313	0.392	16.91	3.188
Composite NOX :	0.131	0.133	0.185	0.148	0.250	0.493	0.044	0.922	1.12	0.218
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (30 mph), with PM10
* File 1, Run 1, Scenario 24.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
```

```
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 30.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                           Month:  July
                        Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.182	0.175	0.205	0.184	0.198	0.291	0.069	0.254	3.05	0.200
Composite CO :	3.14	3.27	3.43	3.32	4.57	1.933	0.274	0.324	14.61	3.097
Composite NOX :	0.123	0.127	0.176	0.141	0.261	0.473	0.042	0.884	1.17	0.209
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
  ------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (35 mph), with PM10
* File 1, Run 1, Scenario 25.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 35.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm
```

```
              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
 ---------------------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
    Composite VOC :      0.172     0.167     0.196     0.175     0.179     0.272     0.062     0.222      2.89     0.188
    Composite CO  :      3.17      3.30      3.46      3.35      4.00      1.824     0.249     0.281     12.91     3.089
    Composite NOX :      0.117     0.124     0.172     0.138     0.271     0.469     0.042     0.876      1.22     0.205
    Composite CO2 :    368.0     479.4     624.5     520.4     894.4     314.1     552.3    1398.5      177.4    569.38
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (40 mph), with PM10
* File 1, Run 1, Scenario 26.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
```

```
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 40.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
  Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
   ---------------------------------------------------------------------------------------------------------------------
  Composite Emission Factors (g/mi):
      Composite VOC :      0.165     0.163     0.191     0.171     0.164     0.257     0.058     0.199      2.78     0.181
      Composite CO  :      3.34      3.49      3.65      3.54      3.70     1.757     0.234     0.254     11.73     3.233
      Composite NOX :      0.118     0.126     0.175     0.140     0.282     0.480     0.043     0.898      1.24     0.209
      Composite CO2 :    368.0     479.4     624.5     520.4     894.4    314.1     552.3    1398.5      177.4    569.38
    ---------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (45 mph), with PM10
* File 1, Run 1, Scenario 27.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

```
* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
             The user supplied arterial average speed of 45.0
             will be used for all hours of the day.  100% of VMT
             has been assigned to the arterial/collector roadway
             type for all hours of the day and all vehicle types.
  M 48 Warning:
               there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                     Calendar Year:  2022
                             Month:  July
                          Altitude:  Low
               Minimum Temperature:  70.4 (F)
               Maximum Temperature:  93.7 (F)
                 Absolute Humidity:   75. grains/lb
               Fuel Sulfur Content:   30. ppm

               Exhaust I/M Program:  Yes
                  Evap I/M Program:  Yes
                       ATP Program:  No
                  Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.159	0.159	0.187	0.167	0.153	0.247	0.054	0.182	2.72	0.175
Composite CO :	3.52	3.68	3.85	3.73	3.62	1.724	0.226	0.241	10.99	3.389
Composite NOX :	0.120	0.129	0.178	0.143	0.292	0.509	0.046	0.953	1.27	0.216
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (50 mph), with PM10
* File 1, Run 1, Scenario 28.
* # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 50.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
```

```
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                           Month:  July
                        Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.153	0.156	0.184	0.164	0.145	0.240	0.052	0.171	2.69	0.170
Composite CO :	3.71	3.87	4.05	3.92	3.74	1.720	0.225	0.239	10.68	3.557
Composite NOX :	0.121	0.132	0.182	0.146	0.303	0.557	0.050	1.047	1.34	0.228
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (55 mph), with PM10
* File 1, Run 1, Scenario 29.
* # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV
```

```
* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 55.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
  Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
   ---------------------------------------------------------------------------------------------------------------------
```

```
 Composite Emission Factors (g/mi):
     Composite VOC :      0.150     0.154     0.182     0.162     0.140    0.235     0.051     0.163      2.69     0.167
     Composite CO  :      3.89      4.06      4.25      4.11      4.08     1.743     0.230     0.249     10.68     3.736
     Composite NOX :      0.123     0.135     0.186     0.149     0.313    0.631     0.057     1.191      1.47     0.243
     Composite CO2 :    368.0     479.4     624.5     520.4     894.4    314.1     552.3    1398.5      177.4    569.38
   ---------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (60 mph), with PM10
* File 1, Run 1, Scenario 30.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 60.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                           Month:  July
```

```
                  Altitude:  Low
            Minimum Temperature:  70.4 (F)
            Maximum Temperature:  93.7 (F)
              Absolute Humidity:   75. grains/lb
            Fuel Sulfur Content:   30. ppm

            Exhaust I/M Program:  Yes
               Evap I/M Program:  Yes
                    ATP Program:  No
               Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.147	0.153	0.181	0.161	0.137	0.233	0.050	0.160	3.08	0.167
Composite CO :	4.07	4.25	4.45	4.31	4.71	1.797	0.243	0.270	18.21	3.957
Composite NOX :	0.124	0.138	0.190	0.153	0.324	0.740	0.067	1.402	1.60	0.265
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (65 mph), with PM10
* File 1, Run 1, Scenario 31.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV
```

```
* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 65.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.145	0.152	0.181	0.160	0.136	0.233	0.050	0.160	3.47	0.167
Composite CO :	4.26	4.45	4.65	4.51	5.73	1.890	0.264	0.307	25.74	4.196
Composite NOX :	0.126	0.141	0.194	0.156	0.335	0.898	0.082	1.712	1.73	0.295
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 35 mph FREEWAY RAMP Scenario - Summer, with PM10
* File 1, Run 1, Scenario 32.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M515 Warning:
            The combined freeway and ramp average speed entered
            cannot be greater than 34.6 miles per hour.
            The average speed will be reset to this value.
  M582 Warning:
            The user supplied freeway average speed of 34.6
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                           Month:  July
                        Altitude:  Low
```

```
              Minimum Temperature:  70.4 (F)
              Maximum Temperature:  93.7 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.184	0.178	0.212	0.188	0.180	0.273	0.063	0.224	2.90	0.199
Composite CO :	4.87	4.88	5.03	4.92	4.04	1.831	0.251	0.284	12.96	4.496
Composite NOX :	0.134	0.149	0.227	0.171	0.270	0.469	0.042	0.842	1.22	0.226
Composite CO2 :	368.0	479.4	624.5	520.4	894.4	314.1	552.3	1398.5	177.4	569.38

```
**********************************************************************
* MOBILE6.2.03 (24-Sep-2003)                                         *
* Input file: MA22_ALL.INP (file 1, run 2).                          *
**********************************************************************
* *** Winter 2022 ***

* Reading Registration Distributions from the following external
* data file: 2005_REG.D
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
```

```
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.999     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.998     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
               0.999     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)
  M 49 Warning:
                1.00     MYR sum not = 1. (will normalize)

* Reading I/M program description records from the following external
* data file: 09NEWIM.D
* 15 Year Exemption Age
* New Annual OBD Exhaust I/M program for Light Duty MY 1996 through 2007 vehicles <=8,500 lb GVWR
* New Annual OBD Exhaust I/M program for Light Duty and Medium duty MY 2008 and later <=14,000 lb GVWR
* New Annual OBD Evap I/M program for Light Duty MY 1996 through 2007 vehicles <=8,500 lb GVWR
* New Annual OBD Evap I/M program for for Light Duty and Medium duty MY 2008 and later <=14,000 lb GVWR
  M601 Comment:
              User has enabled STAGE II REFUELING.


* Reading 94+ LEV IMPLEMENTATION SCHEDULE from the following external
* data file: MA_LEV2.D

  Reading User Supplied Tier2 Exhaust bin phase-in fractions

     Data read from file: LEV2EXH.D


  Reading User Supplied Tier2 EVAP phase-in fractions
```

```
     Data read from file: LEV2EVAP.D


  Reading User Supplied Tier2 50K certification standards

     Data read from file: LEV2CERT.D

  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M614 Comment:
               User supplied diesel sale fractions.

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 DEFAULT SPEED - Winter, with PM2.5
* File 1, Run 2, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
*** I/M credits for Tech1&2 vehicles were read from the following external
     data file: TECH12.D
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
```

```
 HDDV DEFEAT DEVICE EFFECTS ARE PRESENT. THE REBUILD FRACTION IS 0.10.

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
                Minimum Temperature:  22.8 (F)
                Maximum Temperature:  38.3 (F)
                  Absolute Humidity:   75. grains/lb
                Fuel Sulfur Content:   30. ppm

                Exhaust I/M Program:  Yes
                   Evap I/M Program:  Yes
                        ATP Program:  No
                   Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.170	0.189	0.241	0.204	0.195	0.283	0.068	0.253	2.71	0.208
Composite CO :	11.07	9.63	9.49	9.59	6.98	1.996	0.295	0.379	16.82	9.102
Composite NOX :	0.127	0.149	0.209	0.166	0.313	0.561	0.052	1.144	1.76	0.251
Composite CO2 :	368.0	479.4	624.6	520.4	894.5	314.1	552.2	1399.7	177.4	568.78

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 Idle Scenario - Winter (multiply g/mi by 2.5 mph to get g/hr), with PM2.5
* File 1, Run 2, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV
```

```
* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of  2.5
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
  Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
```

```
  ------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      1.464     1.254     1.360     1.284     1.694    0.603     0.174     0.782     10.70     1.335
     Composite CO  :     20.56     18.36     18.68     18.45     32.38     5.128     1.009     1.681    104.23    18.357
     Composite NOX :      0.234     0.276     0.390     0.309     0.229    0.897     0.084     1.808      1.56     0.419
     Composite CO2 :    368.0     479.4     624.5     520.3     894.4    314.1     552.2    1399.6      177.4    568.73
  ------------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (5 mph), with PM2.5
* File 1, Run 2, Scenario 3.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of  5.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
```

```
 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
               Minimum Temperature:  22.8 (F)
               Maximum Temperature:  38.3 (F)
                 Absolute Humidity:   75. grains/lb
               Fuel Sulfur Content:   30. ppm

               Exhaust I/M Program:  Yes
                  Evap I/M Program:  Yes
                       ATP Program:  No
                  Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.510	0.492	0.588	0.519	0.818	0.546	0.155	0.687	7.11	0.565
Composite CO :	14.67	12.99	13.03	13.00	25.87	4.385	0.840	1.372	62.64	13.071
Composite NOX :	0.208	0.245	0.344	0.273	0.235	0.810	0.075	1.629	1.46	0.375
Composite CO2 :	368.0	479.4	624.5	520.3	894.4	314.1	552.2	1399.6	177.4	568.73

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (10 mph), with PM2.5
* File 1, Run 2, Scenario 4.
* # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV
```

```
* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 10.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
  Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
   ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
```

```
     Composite VOC :      0.270     0.283     0.356     0.304     0.479     0.457     0.125     0.539      4.39     0.336
     Composite CO  :     11.93     10.43     10.34     10.41     17.21     3.360     0.606     0.946     33.28    10.310
     Composite NOX :      0.170     0.200     0.282     0.223     0.247     0.678     0.063     1.358      1.38     0.312
     Composite CO2 :    368.0     479.4     624.5     520.3     894.4    314.1     552.2    1399.6      177.4    568.73
   ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (15 mph), with PM2.5
* File 1, Run 2, Scenario 5.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 15.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
```

```
                     Month:  Jan.
                  Altitude:  Low
          Minimum Temperature:  22.8 (F)
          Maximum Temperature:  38.3 (F)
            Absolute Humidity:   75. grains/lb
          Fuel Sulfur Content:   30. ppm

          Exhaust I/M Program:  Yes
             Evap I/M Program:  Yes
                  ATP Program:  No
             Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.214	0.229	0.290	0.246	0.343	0.392	0.104	0.433	3.46	0.269
Composite CO :	11.12	9.64	9.51	9.61	12.10	2.727	0.462	0.683	23.77	9.364
Composite NOX :	0.145	0.171	0.242	0.191	0.259	0.588	0.054	1.173	1.40	0.270
Composite CO2 :	368.0	479.4	624.5	520.3	894.4	314.1	552.2	1399.6	177.4	568.73

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (20 mph), with PM2.5
* File 1, Run 2, Scenario 6.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
```

```
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 20.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
  ------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.186     0.202     0.257     0.217     0.262     0.345     0.088     0.355      3.03     0.233
     Composite CO  :     10.71      9.25      9.10      9.21      8.99     2.325     0.370     0.516     19.39     8.868
```

```
     Composite NOX :      0.133     0.157     0.222     0.175     0.271    0.527     0.048     1.049      1.47     0.247
     Composite CO2 :    368.0     479.4     624.5     520.3     894.4    314.1     552.2    1399.6      177.4    568.73
   ---------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (25 mph), with PM2.5
* File 1, Run 2, Scenario 7.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 25.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                           Month:  Jan.
                        Altitude:  Low
```

```
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.169	0.186	0.237	0.200	0.211	0.311	0.077	0.298	2.76	0.210
Composite CO :	10.48	9.03	8.86	8.98	7.05	2.065	0.311	0.408	16.70	8.579
Composite NOX :	0.126	0.148	0.210	0.166	0.283	0.490	0.045	0.971	1.56	0.234
Composite CO2 :	368.0	479.4	624.5	520.3	894.4	314.1	552.2	1399.6	177.4	568.73

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (30 mph), with PM2.5
* File 1, Run 2, Scenario 8.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV
```

```
* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 30.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                           Month:  Jan.
                        Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.158	0.176	0.226	0.190	0.178	0.285	0.069	0.255	2.56	0.195
Composite CO :	10.41	8.97	8.80	8.92	5.84	1.895	0.272	0.337	14.76	8.468
Composite NOX :	0.121	0.143	0.202	0.159	0.294	0.470	0.043	0.930	1.64	0.226
Composite CO2 :	368.0	479.4	624.5	520.3	894.4	314.1	552.2	1399.6	177.4	568.73

```
  ------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (35 mph), with PM2.5
* File 1, Run 2, Scenario 9.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 35.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
```

```
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  No
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.151	0.170	0.219	0.184	0.155	0.266	0.062	0.224	2.41	0.186
Composite CO :	10.46	9.02	8.85	8.97	5.12	1.786	0.247	0.292	13.32	8.475
Composite NOX :	0.119	0.140	0.199	0.157	0.306	0.466	0.043	0.922	1.70	0.223
Composite CO2 :	368.0	479.4	624.5	520.3	894.4	314.1	552.2	1399.6	177.4	568.73

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (40 mph), with PM2.5
* File 1, Run 2, Scenario 10.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV
```

```
* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 40.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.148     0.169     0.218     0.183     0.140     0.252     0.058     0.200      2.30     0.181
     Composite CO  :     10.73      9.31      9.15      9.27      4.74     1.720     0.232     0.264     12.32     8.705
     Composite NOX :      0.122     0.143     0.203     0.160     0.318     0.477     0.044     0.945      1.74     0.229
     Composite CO2 :    368.0     479.4     624.5     520.3     894.4    314.1     552.2    1399.6      177.4    568.73
  ---------------------------------------------------------------------------------------------------------------------
```

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (45 mph), with PM2.5
* File 1, Run 2, Scenario 11.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 45.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm
```

```
             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  No
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
 ---------------------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
    Composite VOC :      0.146     0.168     0.217     0.182     0.130     0.242     0.054     0.183      2.24     0.178
    Composite CO  :     11.01      9.60      9.46      9.56      4.63     1.687     0.225     0.251     11.69     8.949
    Composite NOX :      0.125     0.147     0.208     0.164     0.330     0.505     0.046     1.003      1.77     0.238
    Composite CO2 :    368.0     479.4     624.5     520.3     894.4    314.1     552.2    1399.6      177.4    568.73
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (50 mph), with PM2.5
* File 1, Run 2, Scenario 12.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
```

```
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 50.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
  Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
   ---------------------------------------------------------------------------------------------------------------------
  Composite Emission Factors (g/mi):
      Composite VOC :      0.143     0.167     0.216     0.181     0.122    0.235     0.052     0.172      2.22     0.175
      Composite CO  :     11.28      9.89      9.76      9.85      4.79     1.683     0.224     0.249     11.43     9.205
      Composite NOX :      0.129     0.151     0.213     0.169     0.342    0.553     0.051     1.102      1.87     0.251
      Composite CO2 :    368.0     479.4     624.5     520.3     894.4    314.1     552.2    1399.6      177.4    568.73
   ---------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (55 mph), with PM2.5
```

```
* File 1, Run 2, Scenario 13.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 55.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
```

```
                Evap I/M Program:  Yes
                     ATP Program:  No
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
 ---------------------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
    Composite VOC :      0.140     0.166     0.215     0.180     0.117    0.230     0.050     0.164      2.22     0.173
    Composite CO  :     11.56     10.18     10.06     10.15      5.22     1.706     0.229     0.258     11.43     9.473
    Composite NOX :      0.132     0.155     0.218     0.173     0.354    0.627     0.058     1.253      2.05     0.268
    Composite CO2 :    368.0     479.4     624.5     520.3     894.4    314.1     552.2    1399.6      177.4    568.73
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (60 mph), with PM2.5
* File 1, Run 2, Scenario 14.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
```

```
           The user supplied arterial average speed of 60.0
           will be used for all hours of the day.  100% of VMT
           has been assigned to the arterial/collector roadway
           type for all hours of the day and all vehicle types.
 M112 Warning:
              Wintertime Reformulated Gasoline Rules Apply
 M 48 Warning:
             there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
                  Calendar Year:  2022
                          Month:  Jan.
                       Altitude:  Low
             Minimum Temperature:  22.8 (F)
             Maximum Temperature:  38.3 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  No
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.137	0.166	0.215	0.180	0.114	0.228	0.050	0.161	2.59	0.173
Composite CO :	11.83	10.47	10.36	10.44	6.02	1.760	0.241	0.281	17.81	9.778
Composite NOX :	0.136	0.160	0.224	0.178	0.366	0.735	0.068	1.475	2.24	0.292
Composite CO2 :	368.0	479.4	624.5	520.3	894.4	314.1	552.2	1399.6	177.4	568.73

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (65 mph), with PM2.5
* File 1, Run 2, Scenario 15.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

```
* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 65.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
                Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
```

```
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
 ---------------------------------------------------------------------------------------------------------------------
Composite Emission Factors (g/mi):
    Composite VOC :      0.136     0.166     0.214     0.180     0.114    0.228     0.050     0.161      2.97     0.174
    Composite CO  :     12.11     10.76     10.66     10.73      7.34     1.852     0.262     0.319     24.18    10.104
    Composite NOX :      0.139     0.164     0.229     0.182     0.378    0.893     0.083     1.800      2.43     0.325
    Composite CO2 :    368.0     479.4     624.5     520.3     894.4    314.1     552.2    1399.6      177.4    568.73
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 35 mph FREEWAY RAMP Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 16.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M515 Warning:
            The combined freeway and ramp average speed entered
            cannot be greater than 34.6 miles per hour.
```

```
           The average speed will be reset to this value.
 M582 Warning:
           The user supplied freeway average speed of 34.6
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
 M112 Warning:
              Wintertime Reformulated Gasoline Rules Apply
 M 48 Warning:
             there are no sales for vehicle class HDGV8b

LEV phase-in data read from file MA_LEV2.D
                  Calendar Year:  2022
                          Month:  Jan.
                       Altitude:  Low
             Minimum Temperature:  22.8 (F)
             Maximum Temperature:  38.3 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  No
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.168	0.184	0.241	0.200	0.157	0.267	0.063	0.226	2.41	0.200
Composite CO :	13.02	11.42	11.28	11.38	5.17	1.793	0.249	0.295	13.36	10.617
Composite NOX :	0.153	0.172	0.269	0.199	0.305	0.466	0.043	0.884	1.70	0.255
Composite CO2 :	368.0	479.4	624.5	520.3	894.4	314.1	552.2	1399.6	177.4	568.73

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

```
* 2022 DEFAULT SPEED - Winter, with PM10
* File 1, Run 2, Scenario 17.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.170	0.189	0.241	0.204	0.195	0.283	0.068	0.253	2.71	0.208
Composite CO :	11.07	9.63	9.49	9.59	6.98	1.996	0.295	0.379	16.82	9.102
Composite NOX :	0.127	0.149	0.209	0.166	0.313	0.561	0.052	1.144	1.76	0.251
Composite CO2 :	368.0	479.4	624.6	520.4	894.5	314.1	552.2	1399.7	177.4	568.78

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 Idle Scenario - Winter (multiply g/mi by 2.5 mph to get g/hr), with PM10
* File 1, Run 2, Scenario 18.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of  2.5
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
```

```
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
               there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                     Calendar Year:  2022
                             Month:  Jan.
                          Altitude:  Low
               Minimum Temperature:  22.8 (F)
               Maximum Temperature:  38.3 (F)
                 Absolute Humidity:   75. grains/lb
               Fuel Sulfur Content:   30. ppm

               Exhaust I/M Program:  Yes
                  Evap I/M Program:  Yes
                       ATP Program:  No
                  Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	1.464	1.254	1.360	1.284	1.694	0.603	0.174	0.782	10.70	1.335
Composite CO :	20.56	18.36	18.68	18.45	32.38	5.128	1.009	1.681	104.23	18.357
Composite NOX :	0.234	0.276	0.390	0.309	0.229	0.897	0.084	1.808	1.56	0.419
Composite CO2 :	368.0	479.4	624.5	520.3	894.4	314.1	552.2	1399.6	177.4	568.73

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (5 mph), with PM10
* File 1, Run 2, Scenario 19.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV
```

```
* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of  5.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC    All Veh
               GVWR:                <6000     >6000     (All)
```

VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0

Composite Emission Factors (g/mi):

Composite VOC :	0.510	0.492	0.588	0.519	0.818	0.546	0.155	0.687	7.11	0.565
Composite CO :	14.67	12.99	13.03	13.00	25.87	4.385	0.840	1.372	62.64	13.071
Composite NOX :	0.208	0.245	0.344	0.273	0.235	0.810	0.075	1.629	1.46	0.375
Composite CO2 :	368.0	479.4	624.5	520.3	894.4	314.1	552.2	1399.6	177.4	568.73

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (10 mph), with PM10
* File 1, Run 2, Scenario 20.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 10.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
```

```
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.270	0.283	0.356	0.304	0.479	0.457	0.125	0.539	4.39	0.336
Composite CO :	11.93	10.43	10.34	10.41	17.21	3.360	0.606	0.946	33.28	10.310
Composite NOX :	0.170	0.200	0.282	0.223	0.247	0.678	0.063	1.358	1.38	0.312
Composite CO2 :	368.0	479.4	624.5	520.3	894.4	314.1	552.2	1399.6	177.4	568.73

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (15 mph), with PM10
* File 1, Run 2, Scenario 21.
* # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV
```

```
* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 15.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
    VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
```

```
 Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.214     0.229     0.290     0.246     0.343    0.392     0.104     0.433      3.46     0.269
     Composite CO  :     11.12      9.64      9.51      9.61     12.10     2.727     0.462     0.683     23.77     9.364
     Composite NOX :      0.145     0.171     0.242     0.191     0.259    0.588     0.054     1.173      1.40     0.270
     Composite CO2 :    368.0     479.4     624.5     520.3     894.4    314.1     552.2    1399.6      177.4    568.73
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (20 mph), with PM10
* File 1, Run 2, Scenario 22.
* # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 20.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
```

```
 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
                Minimum Temperature:  22.8 (F)
                Maximum Temperature:  38.3 (F)
                  Absolute Humidity:   75. grains/lb
                Fuel Sulfur Content:   30. ppm

                Exhaust I/M Program:  Yes
                   Evap I/M Program:  Yes
                        ATP Program:  No
                   Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.186	0.202	0.257	0.217	0.262	0.345	0.088	0.355	3.03	0.233
Composite CO :	10.71	9.25	9.10	9.21	8.99	2.325	0.370	0.516	19.39	8.868
Composite NOX :	0.133	0.157	0.222	0.175	0.271	0.527	0.048	1.049	1.47	0.247
Composite CO2 :	368.0	479.4	624.5	520.3	894.4	314.1	552.2	1399.6	177.4	568.73

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (25 mph), with PM10
* File 1, Run 2, Scenario 23.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
```

```
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 25.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                 <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
  ---------------------------------------------------------------------------------------------------------------------
```

```
 Composite Emission Factors (g/mi):
     Composite VOC :      0.169     0.186     0.237     0.200     0.211    0.311     0.077     0.298      2.76     0.210
     Composite CO  :     10.48      9.03      8.86      8.98      7.05     2.065     0.311     0.408     16.70     8.579
     Composite NOX :      0.126     0.148     0.210     0.166     0.283    0.490     0.045     0.971      1.56     0.234
     Composite CO2 :    368.0     479.4     624.5     520.3     894.4    314.1     552.2    1399.6      177.4    568.73
   ---------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (30 mph), with PM10
* File 1, Run 2, Scenario 24.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 30.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
```

```
                  Calendar Year:  2022
                         Month:  Jan.
                      Altitude:  Low
             Minimum Temperature:  22.8 (F)
             Maximum Temperature:  38.3 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  No
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.158	0.176	0.226	0.190	0.178	0.285	0.069	0.255	2.56	0.195
Composite CO :	10.41	8.97	8.80	8.92	5.84	1.895	0.272	0.337	14.76	8.468
Composite NOX :	0.121	0.143	0.202	0.159	0.294	0.470	0.043	0.930	1.64	0.226
Composite CO2 :	368.0	479.4	624.5	520.3	894.4	314.1	552.2	1399.6	177.4	568.73

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (35 mph), with PM10
* File 1, Run 2, Scenario 25.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV
```

```
* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 35.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.151     0.170     0.219     0.184     0.155     0.266     0.062     0.224      2.41     0.186
```

```
     Composite CO  :     10.46      9.02      8.85      8.97      5.12     1.786     0.247     0.292     13.32     8.475
     Composite NOX :      0.119     0.140     0.199     0.157     0.306    0.466     0.043     0.922      1.70     0.223
     Composite CO2 :    368.0     479.4     624.5     520.3     894.4    314.1     552.2    1399.6      177.4    568.73
   ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (40 mph), with PM10
* File 1, Run 2, Scenario 26.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 40.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                           Month:  Jan.
```

```
                  Altitude:  Low
            Minimum Temperature:  22.8 (F)
            Maximum Temperature:  38.3 (F)
              Absolute Humidity:   75. grains/lb
            Fuel Sulfur Content:   30. ppm

            Exhaust I/M Program:  Yes
               Evap I/M Program:  Yes
                    ATP Program:  No
               Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.148	0.169	0.218	0.183	0.140	0.252	0.058	0.200	2.30	0.181
Composite CO :	10.73	9.31	9.15	9.27	4.74	1.720	0.232	0.264	12.32	8.705
Composite NOX :	0.122	0.143	0.203	0.160	0.318	0.477	0.044	0.945	1.74	0.229
Composite CO2 :	368.0	479.4	624.5	520.3	894.4	314.1	552.2	1399.6	177.4	568.73

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (45 mph), with PM10
* File 1, Run 2, Scenario 27.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV
```

```
* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 45.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.146	0.168	0.217	0.182	0.130	0.242	0.054	0.183	2.24	0.178
Composite CO :	11.01	9.60	9.46	9.56	4.63	1.687	0.225	0.251	11.69	8.949
Composite NOX :	0.125	0.147	0.208	0.164	0.330	0.505	0.046	1.003	1.77	0.238

```
     Composite CO2 :    368.0     479.4     624.5     520.3     894.4    314.1     552.2    1399.6      177.4    568.73
   ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (50 mph), with PM10
* File 1, Run 2, Scenario 28.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 50.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                           Month:  Jan.
                        Altitude:  Low
              Minimum Temperature:  22.8 (F)
```

```
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.143	0.167	0.216	0.181	0.122	0.235	0.052	0.172	2.22	0.175
Composite CO :	11.28	9.89	9.76	9.85	4.79	1.683	0.224	0.249	11.43	9.205
Composite NOX :	0.129	0.151	0.213	0.169	0.342	0.553	0.051	1.102	1.87	0.251
Composite CO2 :	368.0	479.4	624.5	520.3	894.4	314.1	552.2	1399.6	177.4	568.73

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (55 mph), with PM10
* File 1, Run 2, Scenario 29.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
```

```
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 55.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
 ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.140     0.166     0.215     0.180     0.117    0.230     0.050     0.164      2.22     0.173
     Composite CO  :     11.56     10.18     10.06     10.15      5.22     1.706     0.229     0.258     11.43     9.473
     Composite NOX :      0.132     0.155     0.218     0.173     0.354    0.627     0.058     1.253      2.05     0.268
     Composite CO2 :    368.0     479.4     624.5     520.3     894.4    314.1     552.2    1399.6      177.4    568.73
  ---------------------------------------------------------------------------------------------------------------------
```

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (60 mph), with PM10
* File 1, Run 2, Scenario 30.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 60.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
```

```
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.137	0.166	0.215	0.180	0.114	0.228	0.050	0.161	2.59	0.173
Composite CO :	11.83	10.47	10.36	10.44	6.02	1.760	0.241	0.281	17.81	9.778
Composite NOX :	0.136	0.160	0.224	0.178	0.366	0.735	0.068	1.475	2.24	0.292
Composite CO2 :	368.0	479.4	624.5	520.3	894.4	314.1	552.2	1399.6	177.4	568.73

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (65 mph), with PM10
* File 1, Run 2, Scenario 31.
* # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV
```

```
* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M583 Warning:
            The user supplied arterial average speed of 65.0
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                           Month:  Jan.
                        Altitude:  Low
              Minimum Temperature:  22.8 (F)
              Maximum Temperature:  38.3 (F)
                Absolute Humidity:   75. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  No
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
 Fuel Economy (mpg):      24.1      18.5      14.2      17.0       9.9      32.4      18.4       7.3      50.0      16.0
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.136     0.166     0.214     0.180     0.114    0.228     0.050     0.161      2.97     0.174
     Composite CO  :     12.11     10.76     10.66     10.73      7.34     1.852     0.262     0.319     24.18    10.104
     Composite NOX :      0.139     0.164     0.229     0.182     0.378    0.893     0.083     1.800      2.43     0.325
     Composite CO2 :    368.0     479.4     624.5     520.3     894.4    314.1     552.2    1399.6      177.4    568.73
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
```

```
* 2022 35 mph FREEWAY RAMP Scenario - Winter, with PM10
* File 1, Run 2, Scenario 32.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #

* Reading PM Gas Carbon ZML Levels
* from the external data file PMGZML.CSV

* Reading PM Gas Carbon DR1 Levels
* from the external data file PMGDR1.CSV

* Reading PM Gas Carbon DR2 Levels
* from the external data file PMGDR2.CSV

* Reading PM Diesel Zero Mile Levels
* from the external data file PMDZML.CSV

* Reading the First PM Deterioration Rates
* from the external data file PMDDR1.CSV

* Reading the Second PM Deterioration Rates
* from the external data file PMDDR2.CSV
  M515 Warning:
            The combined freeway and ramp average speed entered
            cannot be greater than 34.6 miles per hour.
            The average speed will be reset to this value.
  M582 Warning:
            The user supplied freeway average speed of 34.6
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M112 Warning:
               Wintertime Reformulated Gasoline Rules Apply
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

 LEV phase-in data read from file MA_LEV2.D
                    Calendar Year:  2022
                           Month:  Jan.
                        Altitude:  Low
```

```
             Minimum Temperature:  22.8 (F)
             Maximum Temperature:  38.3 (F)
               Absolute Humidity:   75. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  No
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Fuel Economy (mpg):	24.1	18.5	14.2	17.0	9.9	32.4	18.4	7.3	50.0	16.0
Composite Emission Factors (g/mi):										
Composite VOC :	0.168	0.184	0.241	0.200	0.157	0.267	0.063	0.226	2.41	0.200
Composite CO :	13.02	11.42	11.28	11.38	5.17	1.793	0.249	0.295	13.36	10.617
Composite NOX :	0.153	0.172	0.269	0.199	0.305	0.466	0.043	0.884	1.70	0.255
Composite CO2 :	368.0	479.4	624.5	520.3	894.4	314.1	552.2	1399.6	177.4	568.73

```
**********************************************************************
* MOBILE6.2.03 (24-Sep-2003)                                         *
* Input file: MA22_ALL.INP (file 1, run 1).                          *
**********************************************************************

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 DEFAULT SPEED - Summer, with PM2.5
* File 1, Run 1, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2022
                                 Month:  July
            Gasoline Fuel Sulfur Content:   30. ppm
              Diesel Fuel Sulfur Content:   15. ppm
                    Particle Size Cutoff:  2.50 Microns
                        Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
 ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
               Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
              GASPM:    0.0036    0.0034    0.0034    0.0034    0.0090    ------    ------    ------    0.0142    0.0034
            ECARBON:    ------    ------    ------    ------    ------    0.0681    0.0036    0.0196    ------    0.0017
            OCARBON:    ------    ------    ------    ------    ------    0.0192    0.0052    0.0098    ------    0.0009
                SO4:    0.0003    0.0005    0.0005    0.0005    0.0019    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:    0.0039    0.0039    0.0039    0.0039    0.0109    0.0875    0.0091    0.0302    0.0143    0.0065
              Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
               Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
           Total PM:    0.0112    0.0112    0.0112    0.0112    0.0183    0.0948    0.0165    0.0418    0.0206    0.0142
                SO2:    0.0065    0.0087    0.0115    0.0095    0.0162    0.0029    0.0052    0.0130    0.0033    0.0093
                NH3:    0.0998    0.1013    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0920
 ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 Idle Scenario - Summer (multiply g/mi by 2.5 mph to get g/hr), with PM2.5
* File 1, Run 1, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

```
                          Calendar Year:  2022
                                 Month:  July
            Gasoline Fuel Sulfur Content:   30. ppm
              Diesel Fuel Sulfur Content:   15. ppm
                    Particle Size Cutoff:  2.50 Microns
                       Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Composite Emission Factors (g/mi):										
Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0034	0.0033	0.0033	0.0033	0.0094	------	------	------	0.0142	0.0033
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0196	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0098	------	0.0009
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0108	0.0875	0.0091	0.0302	0.0144	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0113	0.0113	0.0113	0.0182	0.0948	0.0165	0.0418	0.0207	0.0142
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0092
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (5 mph), with PM2.5
* File 1, Run 1, Scenario 3.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2022
                                 Month:  July
            Gasoline Fuel Sulfur Content:   30. ppm
              Diesel Fuel Sulfur Content:   15. ppm
                    Particle Size Cutoff:  2.50 Microns
                       Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC    All Veh
```

GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0034	0.0033	0.0033	0.0033	0.0094	------	------	------	0.0142	0.0033
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0196	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0098	------	0.0009
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0108	0.0875	0.0091	0.0302	0.0144	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0113	0.0113	0.0113	0.0182	0.0948	0.0165	0.0418	0.0207	0.0142
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0092
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (10 mph), with PM2.5
* File 1, Run 1, Scenario 4.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

Calendar Year: 2022
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 2.50 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0034	0.0033	0.0033	0.0033	0.0094	------	------	------	0.0142	0.0033
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0196	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0098	------	0.0009

SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0108	0.0875	0.0091	0.0302	0.0144	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0113	0.0113	0.0113	0.0182	0.0948	0.0165	0.0418	0.0207	0.0142
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0092
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (15 mph), with PM2.5
* File 1, Run 1, Scenario 5.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2022
                                 Month:  July
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff:  2.50 Microns
                         Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0034	0.0033	0.0033	0.0033	0.0094	------	------	------	0.0142	0.0033
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0196	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0098	------	0.0009
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0108	0.0875	0.0091	0.0302	0.0144	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0113	0.0113	0.0113	0.0182	0.0948	0.0165	0.0418	0.0207	0.0142
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0092
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (20 mph), with PM2.5
* File 1, Run 1, Scenario 6.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

                              Calendar Year:  2022
                                     Month:  July
                 Gasoline Fuel Sulfur Content:   30. ppm
                   Diesel Fuel Sulfur Content:   15. ppm
                        Particle Size Cutoff:  2.50 Microns
                           Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
                GVWR:               <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
               Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0034    0.0033    0.0033    0.0033    0.0094    ------    ------    ------    0.0142    0.0033
           ECARBON:    ------    ------    ------    ------    ------    0.0681    0.0036    0.0196    ------    0.0017
           OCARBON:    ------    ------    ------    ------    ------    0.0192    0.0052    0.0098    ------    0.0009
               SO4:    0.0005    0.0006    0.0006    0.0006    0.0014    0.0002    0.0003    0.0009    0.0002    0.0006
   Total Exhaust PM:    0.0039    0.0039    0.0039    0.0039    0.0108    0.0875    0.0091    0.0302    0.0144    0.0065
             Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
              Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
          Total PM:    0.0112    0.0113    0.0113    0.0113    0.0182    0.0948    0.0165    0.0418    0.0207    0.0142
               SO2:    0.0065    0.0087    0.0115    0.0095    0.0163    0.0029    0.0052    0.0130    0.0033    0.0092
               NH3:    0.0998    0.1012    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0920
 -------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (25 mph), with PM2.5
* File 1, Run 1, Scenario 7.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

                              Calendar Year:  2022
                                     Month:  July
                 Gasoline Fuel Sulfur Content:   30. ppm
                   Diesel Fuel Sulfur Content:   15. ppm
```

```
                    Particle Size Cutoff:  2.50 Microns
                        Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
               Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0035    0.0034    0.0034    0.0034    0.0092    ------    ------    ------    0.0142    0.0034
            ECARBON:    ------    ------    ------    ------    ------    0.0681    0.0036    0.0196    ------    0.0017
            OCARBON:    ------    ------    ------    ------    ------    0.0192    0.0052    0.0098    ------    0.0009
                SO4:    0.0004    0.0005    0.0005    0.0005    0.0016    0.0002    0.0003    0.0009    0.0001    0.0006
  Total Exhaust PM:    0.0039    0.0039    0.0039    0.0039    0.0108    0.0875    0.0091    0.0302    0.0143    0.0065
             Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
              Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
          Total PM:    0.0112    0.0112    0.0113    0.0112    0.0183    0.0948    0.0165    0.0418    0.0207    0.0142
               SO2:    0.0065    0.0087    0.0115    0.0095    0.0163    0.0029    0.0052    0.0130    0.0033    0.0093
               NH3:    0.0998    0.1012    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0920
 -------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (30 mph), with PM2.5
* File 1, Run 1, Scenario 8.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2022
                                 Month:  July
             Gasoline Fuel Sulfur Content:   30. ppm
               Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff:  2.50 Microns
                         Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
```

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0036	0.0034	0.0034	0.0034	0.0090	------	------	------	0.0142	0.0034
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0196	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0098	------	0.0009
SO4:	0.0003	0.0005	0.0005	0.0005	0.0018	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0108	0.0875	0.0091	0.0302	0.0143	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0112	0.0112	0.0112	0.0183	0.0948	0.0165	0.0418	0.0206	0.0142
SO2:	0.0065	0.0087	0.0115	0.0095	0.0162	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

---

* #
* 2022 - Summer (35 mph), with PM2.5
* File 1, Run 1, Scenario 9.
* #

Calendar Year: 2022
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 2.50 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0088	------	------	------	0.0142	0.0035
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0196	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0098	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0109	0.0875	0.0091	0.0302	0.0143	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0112	0.0112	0.0112	0.0183	0.0948	0.0165	0.0418	0.0206	0.0142

SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (40 mph), with PM2.5
* File 1, Run 1, Scenario 10.
* # # # # # # # # # # # # # # # # # # # # # # # #
```

```
                          Calendar Year:  2022
                                 Month:  July
            Gasoline Fuel Sulfur Content:   30. ppm
              Diesel Fuel Sulfur Content:   15. ppm
                    Particle Size Cutoff:  2.50 Microns
                       Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0088	------	------	------	0.0142	0.0035
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0196	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0098	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0109	0.0875	0.0091	0.0302	0.0143	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0112	0.0112	0.0112	0.0183	0.0948	0.0165	0.0418	0.0206	0.0142
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (45 mph), with PM2.5
* File 1, Run 1, Scenario 11.
* # # # # # # # # # # # # # # # # # # # # # # # #
```

```
                          Calendar Year:  2022
                                 Month:  July
          Gasoline Fuel Sulfur Content:   30. ppm
            Diesel Fuel Sulfur Content:   15. ppm
                 Particle Size Cutoff:  2.50 Microns
                     Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:              <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0037    0.0035    0.0035    0.0035    0.0088    ------    ------    ------    0.0142    0.0035
           ECARBON:    ------    ------    ------    ------    ------    0.0681    0.0036    0.0196    ------    0.0017
           OCARBON:    ------    ------    ------    ------    ------    0.0192    0.0052    0.0098    ------    0.0009
               SO4:    0.0002    0.0004    0.0004    0.0004    0.0021    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:    0.0039    0.0039    0.0039    0.0039    0.0109    0.0875    0.0091    0.0302    0.0143    0.0065
             Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
              Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
          Total PM:    0.0112    0.0112    0.0112    0.0112    0.0183    0.0948    0.0165    0.0418    0.0206    0.0142
               SO2:    0.0066    0.0088    0.0115    0.0095    0.0161    0.0029    0.0052    0.0130    0.0033    0.0093
               NH3:    0.0998    0.1012    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0920
 -------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (50 mph), with PM2.5
* File 1, Run 1, Scenario 12.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2022
                                 Month:  July
          Gasoline Fuel Sulfur Content:   30. ppm
            Diesel Fuel Sulfur Content:   15. ppm
                 Particle Size Cutoff:  2.50 Microns
                     Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:              <6000     >6000     (All)
```

VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0088	------	------	------	0.0142	0.0035
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0196	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0098	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0109	0.0875	0.0091	0.0302	0.0143	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0112	0.0112	0.0112	0.0183	0.0948	0.0165	0.0418	0.0206	0.0142
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0098	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (55 mph), with PM2.5
* File 1, Run 1, Scenario 13.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2022
                                  Month:  July
               Gasoline Fuel Sulfur Content:   30. ppm
                 Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff:  2.50 Microns
                           Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0088	------	------	------	0.0142	0.0035
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0196	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0098	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005

Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0109	0.0875	0.0091	0.0302	0.0143	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0112	0.0112	0.0112	0.0183	0.0948	0.0165	0.0418	0.0206	0.0142
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

----

* #
* 2022 - Summer (60 mph), with PM2.5
* File 1, Run 1, Scenario 14.
* #

Calendar Year: 2022
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 2.50 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0088	------	------	------	0.0142	0.0035
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0196	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0098	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0109	0.0875	0.0091	0.0302	0.0143	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0112	0.0112	0.0112	0.0183	0.0948	0.0165	0.0418	0.0206	0.0142
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

----

* #

```
* 2022 - Summer (65 mph), with PM2.5
* File 1, Run 1, Scenario 15.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2022
                                    Month:  July
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                      Particle Size Cutoff:  2.50 Microns
                          Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
-------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0037    0.0035    0.0035    0.0035    0.0088    ------    ------    ------    0.0142    0.0035
           ECARBON:    ------    ------    ------    ------    ------    0.0681    0.0036    0.0196    ------    0.0017
           OCARBON:    ------    ------    ------    ------    ------    0.0192    0.0052    0.0098    ------    0.0009
               SO4:    0.0002    0.0004    0.0004    0.0004    0.0021    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:    0.0039    0.0039    0.0039    0.0039    0.0109    0.0875    0.0091    0.0302    0.0143    0.0065
             Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
              Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
          Total PM:    0.0112    0.0112    0.0112    0.0112    0.0183    0.0948    0.0165    0.0418    0.0206    0.0142
               SO2:    0.0066    0.0088    0.0115    0.0095    0.0161    0.0029    0.0052    0.0130    0.0033    0.0093
               NH3:    0.0998    0.1012    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0920
-------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 35 mph FREEWAY RAMP Scenario - Summer, with PM2.5
* File 1, Run 1, Scenario 16.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2022
                                    Month:  July
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                      Particle Size Cutoff:  2.50 Microns
```

```
                    Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
             GVWR:                 <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
            GASPM:    0.0037    0.0035    0.0035    0.0035    0.0088    ------    ------    ------    0.0142    0.0035
          ECARBON:    ------    ------    ------    ------    ------    0.0681    0.0036    0.0196    ------    0.0017
          OCARBON:    ------    ------    ------    ------    ------    0.0192    0.0052    0.0098    ------    0.0009
              SO4:    0.0002    0.0004    0.0004    0.0004    0.0021    0.0002    0.0003    0.0009    0.0001    0.0005
   Total Exhaust PM:    0.0039    0.0039    0.0039    0.0039    0.0109    0.0875    0.0091    0.0302    0.0143    0.0065
            Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
             Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
         Total PM:    0.0112    0.0112    0.0112    0.0112    0.0183    0.0948    0.0165    0.0418    0.0206    0.0142
              SO2:    0.0066    0.0088    0.0115    0.0095    0.0161    0.0029    0.0052    0.0130    0.0033    0.0093
              NH3:    0.0998    0.1012    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0920
 -------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 DEFAULT SPEED - Summer, with PM10
* File 1, Run 1, Scenario 17.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2022
                                  Month:  July
                Gasoline Fuel Sulfur Content:   30. ppm
                  Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff: 10.00 Microns
                           Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
             GVWR:                 <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
```

GASPM:	0.0039	0.0037	0.0037	0.0037	0.0098	------	------	------	0.0205	0.0037
ECARBON:	------	------	------	------	------	0.0740	0.0039	0.0213	------	0.0018
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0106	------	0.0009
SO4:	0.0003	0.0005	0.0005	0.0005	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0117	0.0951	0.0099	0.0328	0.0206	0.0070
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0328	0.1156	0.0304	0.0702	0.0371	0.0290
SO2:	0.0065	0.0087	0.0115	0.0095	0.0162	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0998	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

* #
* 2022 Idle Scenario - Summer (multiply g/mi by 2.5 mph to get g/hr), with PM10
* File 1, Run 1, Scenario 18.
* #

Calendar Year: 2022
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0036	0.0036	0.0036	0.0103	------	------	------	0.0205	0.0036
ECARBON:	------	------	------	------	------	0.0740	0.0039	0.0213	------	0.0018
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0106	------	0.0009
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0117	0.0950	0.0099	0.0328	0.0207	0.0070
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0328	0.1156	0.0304	0.0701	0.0372	0.0290
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0092

NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

* #
* 2022 - Summer (5 mph), with PM10
* File 1, Run 1, Scenario 19.
* #

Calendar Year: 2022
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0036	0.0036	0.0036	0.0103	------	------	------	0.0205	0.0036
ECARBON:	------	------	------	------	------	0.0740	0.0039	0.0213	------	0.0018
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0106	------	0.0009
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0117	0.0950	0.0099	0.0328	0.0207	0.0070
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0328	0.1156	0.0304	0.0701	0.0372	0.0290
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0092
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

* #
* 2022 - Summer (10 mph), with PM10
* File 1, Run 1, Scenario 20.
* #

Calendar Year: 2022

```
                                 Month:  July
                Gasoline Fuel Sulfur Content:   30. ppm
                  Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff: 10.00 Microns
                           Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Composite Emission Factors (g/mi):										
Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0036	0.0036	0.0036	0.0103	------	------	------	0.0205	0.0036
ECARBON:	------	------	------	------	------	0.0740	0.0039	0.0213	------	0.0018
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0106	------	0.0009
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0117	0.0950	0.0099	0.0328	0.0207	0.0070
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0328	0.1156	0.0304	0.0701	0.0372	0.0290
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0092
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (15 mph), with PM10
* File 1, Run 1, Scenario 21.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2022
                                 Month:  July
                Gasoline Fuel Sulfur Content:   30. ppm
                  Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff: 10.00 Microns
                           Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						

VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0036	0.0036	0.0036	0.0103	------	------	------	0.0205	0.0036
ECARBON:	------	------	------	------	------	0.0740	0.0039	0.0213	------	0.0018
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0106	------	0.0009
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0117	0.0950	0.0099	0.0328	0.0207	0.0070
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0328	0.1156	0.0304	0.0701	0.0372	0.0290
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0092
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (20 mph), with PM10
* File 1, Run 1, Scenario 22.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

Calendar Year: 2022
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0036	0.0036	0.0036	0.0103	------	------	------	0.0205	0.0036
ECARBON:	------	------	------	------	------	0.0740	0.0039	0.0213	------	0.0018
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0106	------	0.0009
SO4:	0.0005	0.0006	0.0006	0.0006	0.0014	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0117	0.0950	0.0099	0.0328	0.0207	0.0070

Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0328	0.1156	0.0304	0.0701	0.0372	0.0290
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0092
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

* #
* 2022 - Summer (25 mph), with PM10
* File 1, Run 1, Scenario 23.
* #

Calendar Year: 2022
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0038	0.0037	0.0037	0.0037	0.0101	------	------	------	0.0205	0.0037
ECARBON:	------	------	------	------	------	0.0740	0.0039	0.0213	------	0.0018
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0106	------	0.0009
SO4:	0.0004	0.0005	0.0005	0.0005	0.0016	0.0002	0.0003	0.0009	0.0001	0.0006
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0117	0.0950	0.0099	0.0328	0.0206	0.0070
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0328	0.1156	0.0304	0.0701	0.0372	0.0290
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

* #
* 2022 - Summer (30 mph), with PM10

```
* File 1, Run 1, Scenario 24.
* # # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2022
                                    Month:  July
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff: 10.00 Microns
                         Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
-------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0039    0.0037    0.0037    0.0037    0.0099    ------    ------    ------    0.0205    0.0037
           ECARBON:    ------    ------    ------    ------    ------    0.0740    0.0039    0.0213    ------    0.0018
           OCARBON:    ------    ------    ------    ------    ------    0.0209    0.0057    0.0106    ------    0.0009
               SO4:    0.0003    0.0005    0.0005    0.0005    0.0018    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:    0.0042    0.0042    0.0042    0.0042    0.0117    0.0950    0.0099    0.0328    0.0206    0.0070
             Brake:    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125
              Tire:    0.0080    0.0080    0.0080    0.0080    0.0085    0.0080    0.0080    0.0248    0.0040    0.0095
          Total PM:    0.0247    0.0247    0.0247    0.0247    0.0328    0.1156    0.0304    0.0701    0.0371    0.0290
               SO2:    0.0065    0.0087    0.0115    0.0095    0.0162    0.0029    0.0052    0.0130    0.0033    0.0093
               NH3:    0.0998    0.1012    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0920
-------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (35 mph), with PM10
* File 1, Run 1, Scenario 25.
* # # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2022
                                    Month:  July
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff: 10.00 Microns
                         Reformulated Gas:  Yes
```

```
      Vehicle Type:    LDGV    LDGT12   LDGT34    LDGT     HDGV     LDDV     LDDT     HDDV       MC  All Veh
              GVWR:             <6000    >6000   (All)
                     ------    ------   ------   ------   ------   ------   ------   ------   ------   ------
  VMT Distribution:  0.2607    0.4379   0.1723            0.0375   0.0000   0.0015   0.0864   0.0036   1.0000
 ------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:  0.0000    0.0000   0.0000   0.0000   0.0000   ------   ------   ------   0.0000   0.0000
             GASPM:  0.0040    0.0038   0.0038   0.0038   0.0097   ------   ------   ------   0.0205   0.0038
           ECARBON:  ------    ------   ------   ------   ------   0.0740   0.0039   0.0213   ------   0.0018
           OCARBON:  ------    ------   ------   ------   ------   0.0209   0.0057   0.0106   ------   0.0009
               SO4:  0.0002    0.0004   0.0004   0.0004   0.0021   0.0002   0.0003   0.0009   0.0001   0.0005
  Total Exhaust PM:  0.0042    0.0042   0.0042   0.0042   0.0117   0.0950   0.0099   0.0328   0.0206   0.0070
             Brake:  0.0125    0.0125   0.0125   0.0125   0.0125   0.0125   0.0125   0.0125   0.0125   0.0125
              Tire:  0.0080    0.0080   0.0080   0.0080   0.0085   0.0080   0.0080   0.0248   0.0040   0.0095
          Total PM:  0.0247    0.0247   0.0247   0.0247   0.0328   0.1156   0.0304   0.0701   0.0371   0.0290
               SO2:  0.0066    0.0088   0.0115   0.0095   0.0161   0.0029   0.0052   0.0130   0.0033   0.0093
               NH3:  0.0998    0.1012   0.1017   0.1014   0.0451   0.0068   0.0068   0.0270   0.0113   0.0920
 ------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (40 mph), with PM10
* File 1, Run 1, Scenario 26.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2022
                                    Month:  July
                Gasoline Fuel Sulfur Content:   30. ppm
                  Diesel Fuel Sulfur Content:   15. ppm
                      Particle Size Cutoff: 10.00 Microns
                          Reformulated Gas:  Yes

      Vehicle Type:    LDGV    LDGT12   LDGT34    LDGT     HDGV     LDDV     LDDT     HDDV       MC  All Veh
              GVWR:             <6000    >6000   (All)
                     ------    ------   ------   ------   ------   ------   ------   ------   ------   ------
  VMT Distribution:  0.2607    0.4379   0.1723            0.0375   0.0000   0.0015   0.0864   0.0036   1.0000
 ------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:  0.0000    0.0000   0.0000   0.0000   0.0000   ------   ------   ------   0.0000   0.0000
             GASPM:  0.0040    0.0038   0.0038   0.0038   0.0097   ------   ------   ------   0.0205   0.0038
```

ECARBON:	------	------	------	------	------	0.0740	0.0039	0.0213	------	0.0018
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0106	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0117	0.0950	0.0099	0.0328	0.0206	0.0070
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0328	0.1156	0.0304	0.0701	0.0371	0.0290
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (45 mph), with PM10
* File 1, Run 1, Scenario 27.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2022
                                 Month:  July
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff: 10.00 Microns
                         Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0097	------	------	------	0.0205	0.0038
ECARBON:	------	------	------	------	------	0.0740	0.0039	0.0213	------	0.0018
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0106	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0117	0.0950	0.0099	0.0328	0.0206	0.0070
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0328	0.1156	0.0304	0.0701	0.0371	0.0290
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (50 mph), with PM10
* File 1, Run 1, Scenario 28.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                Calendar Year:  2022
                        Month:  July
  Gasoline Fuel Sulfur Content:   30. ppm
    Diesel Fuel Sulfur Content:   15. ppm
         Particle Size Cutoff: 10.00 Microns
             Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000
Composite Emission Factors (g/mi):										
Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0097	------	------	------	0.0205	0.0038
ECARBON:	------	------	------	------	------	0.0740	0.0039	0.0213	------	0.0018
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0106	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0117	0.0950	0.0099	0.0328	0.0206	0.0070
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0328	0.1156	0.0304	0.0701	0.0371	0.0290
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (55 mph), with PM10
* File 1, Run 1, Scenario 29.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                Calendar Year:  2022
                        Month:  July
```

```
                Gasoline Fuel Sulfur Content:   30. ppm
                  Diesel Fuel Sulfur Content:   15. ppm
                        Particle Size Cutoff: 10.00 Microns
                            Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT       HDGV       LDDV       LDDT       HDDV         MC    All Veh
               GVWR:               <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
               Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
              GASPM:    0.0040    0.0038    0.0038    0.0038    0.0097    ------    ------    ------    0.0205    0.0038
            ECARBON:    ------    ------    ------    ------    ------    0.0740    0.0039    0.0213    ------    0.0018
            OCARBON:    ------    ------    ------    ------    ------    0.0209    0.0057    0.0106    ------    0.0009
                SO4:    0.0002    0.0004    0.0004    0.0004    0.0021    0.0002    0.0003    0.0009    0.0001    0.0005
   Total Exhaust PM:    0.0042    0.0042    0.0042    0.0042    0.0117    0.0950    0.0099    0.0328    0.0206    0.0070
              Brake:    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125
               Tire:    0.0080    0.0080    0.0080    0.0080    0.0085    0.0080    0.0080    0.0248    0.0040    0.0095
           Total PM:    0.0247    0.0247    0.0247    0.0247    0.0328    0.1156    0.0304    0.0701    0.0371    0.0290
                SO2:    0.0066    0.0088    0.0115    0.0095    0.0161    0.0029    0.0052    0.0130    0.0033    0.0093
                NH3:    0.0998    0.1012    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0920
 -------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Summer (60 mph), with PM10
* File 1, Run 1, Scenario 30.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2022
                                   Month:  July
                Gasoline Fuel Sulfur Content:   30. ppm
                  Diesel Fuel Sulfur Content:   15. ppm
                        Particle Size Cutoff: 10.00 Microns
                            Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT       HDGV       LDDV       LDDT       HDDV         MC    All Veh
               GVWR:               <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2607    0.4379    0.1723              0.0375    0.0000    0.0015    0.0864    0.0036    1.0000
```

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0097	------	------	------	0.0205	0.0038
ECARBON:	------	------	------	------	------	0.0740	0.0039	0.0213	------	0.0018
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0106	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0117	0.0950	0.0099	0.0328	0.0206	0.0070
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0328	0.1156	0.0304	0.0701	0.0371	0.0290
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

* #
* 2022 - Summer (65 mph), with PM10
* File 1, Run 1, Scenario 31.
* #

Calendar Year: 2022
Month: July
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0097	------	------	------	0.0205	0.0038
ECARBON:	------	------	------	------	------	0.0740	0.0039	0.0213	------	0.0018
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0106	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0117	0.0950	0.0099	0.0328	0.0206	0.0070
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125

Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0328	0.1156	0.0304	0.0701	0.0371	0.0290
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 35 mph FREEWAY RAMP Scenario - Summer, with PM10
* File 1, Run 1, Scenario 32.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2022
                                 Month:  July
             Gasoline Fuel Sulfur Content:   30. ppm
               Diesel Fuel Sulfur Content:   15. ppm
                    Particle Size Cutoff: 10.00 Microns
                       Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.2607	0.4379	0.1723		0.0375	0.0000	0.0015	0.0864	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0097	------	------	------	0.0205	0.0038
ECARBON:	------	------	------	------	------	0.0740	0.0039	0.0213	------	0.0018
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0106	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0117	0.0950	0.0099	0.0328	0.0206	0.0070
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0248	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0328	0.1156	0.0304	0.0701	0.0371	0.0290
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0998	0.1012	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0920

```
**********************************************************************
* MOBILE6.2.03 (24-Sep-2003)                                         *
* Input file: MA22_ALL.INP (file 1, run 2).                          *
**********************************************************************
```

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 DEFAULT SPEED - Winter, with PM2.5
* File 1, Run 2, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

                              Calendar Year:  2022
                                     Month:  Jan.
                 Gasoline Fuel Sulfur Content:   30. ppm
                   Diesel Fuel Sulfur Content:   15. ppm
                         Particle Size Cutoff:  2.50 Microns
                             Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
 ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
               Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
              GASPM:    0.0036    0.0034    0.0034    0.0034    0.0092    ------    ------    ------    0.0142    0.0034
            ECARBON:    ------    ------    ------    ------    ------    0.0681    0.0036    0.0201    ------    0.0017
            OCARBON:    ------    ------    ------    ------    ------    0.0192    0.0052    0.0100    ------    0.0009
                SO4:    0.0003    0.0005    0.0005    0.0005    0.0019    0.0002    0.0003    0.0009    0.0001    0.0005
   Total Exhaust PM:    0.0039    0.0039    0.0039    0.0039    0.0111    0.0875    0.0092    0.0311    0.0143    0.0065
              Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
               Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
           Total PM:    0.0112    0.0112    0.0112    0.0112    0.0185    0.0948    0.0165    0.0426    0.0206    0.0142
                SO2:    0.0065    0.0087    0.0115    0.0095    0.0162    0.0029    0.0052    0.0130    0.0033    0.0093
                NH3:    0.0999    0.1013    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0921
 ---------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 Idle Scenario - Winter (multiply g/mi by 2.5 mph to get g/hr), with PM2.5
* File 1, Run 2, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

                              Calendar Year:  2022
                                     Month:  Jan.
                 Gasoline Fuel Sulfur Content:   30. ppm
```

```
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff:  2.50 Microns
                         Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
 -------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
               Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
              GASPM:    0.0034    0.0033    0.0033    0.0033    0.0096    ------    ------    ------    0.0142    0.0033
            ECARBON:    ------    ------    ------    ------    ------    0.0681    0.0036    0.0201    ------    0.0017
            OCARBON:    ------    ------    ------    ------    ------    0.0192    0.0052    0.0100    ------    0.0009
                SO4:    0.0005    0.0006    0.0006    0.0006    0.0013    0.0002    0.0003    0.0009    0.0002    0.0006
   Total Exhaust PM:    0.0039    0.0039    0.0039    0.0039    0.0110    0.0875    0.0092    0.0311    0.0144    0.0066
              Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
               Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
           Total PM:    0.0112    0.0113    0.0113    0.0113    0.0184    0.0948    0.0165    0.0426    0.0207    0.0143
                SO2:    0.0065    0.0087    0.0115    0.0095    0.0163    0.0029    0.0052    0.0130    0.0033    0.0092
                NH3:    0.0999    0.1013    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0921
 -------------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (5 mph), with PM2.5
* File 1, Run 2, Scenario 3.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                           Calendar Year:  2022
                                   Month:  Jan.
                Gasoline Fuel Sulfur Content:   30. ppm
                  Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff:  2.50 Microns
                           Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
 -------------------------------------------------------------------------------------------------------------------------
```

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0034	0.0033	0.0033	0.0033	0.0096	------	------	------	0.0142	0.0033
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0201	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0100	------	0.0009
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0110	0.0875	0.0092	0.0311	0.0144	0.0066
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0113	0.0113	0.0113	0.0184	0.0948	0.0165	0.0426	0.0207	0.0143
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0092
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

---

* #
* 2022 - Winter (10 mph), with PM2.5
* File 1, Run 2, Scenario 4.
* #

Calendar Year: 2022
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 2.50 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0034	0.0033	0.0033	0.0033	0.0096	------	------	------	0.0142	0.0033
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0201	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0100	------	0.0009
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0110	0.0875	0.0092	0.0311	0.0144	0.0066
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024

Total PM:	0.0112	0.0113	0.0113	0.0113	0.0184	0.0948	0.0165	0.0426	0.0207	0.0143
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0092
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

* #
* 2022 - Winter (15 mph), with PM2.5
* File 1, Run 2, Scenario 5.
* #

Calendar Year: 2022
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 2.50 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0034	0.0033	0.0033	0.0033	0.0096	------	------	------	0.0142	0.0033
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0201	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0100	------	0.0009
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0110	0.0875	0.0092	0.0311	0.0144	0.0066
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0113	0.0113	0.0113	0.0184	0.0948	0.0165	0.0426	0.0207	0.0143
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0092
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

* #
* 2022 - Winter (20 mph), with PM2.5
* File 1, Run 2, Scenario 6.
* #

```
                          Calendar Year:  2022
                                 Month:  Jan.
            Gasoline Fuel Sulfur Content:   30. ppm
              Diesel Fuel Sulfur Content:   15. ppm
                    Particle Size Cutoff:  2.50 Microns
                       Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000
Composite Emission Factors (g/mi):										
Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0034	0.0033	0.0033	0.0033	0.0096	------	------	------	0.0142	0.0033
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0201	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0100	------	0.0009
SO4:	0.0005	0.0006	0.0006	0.0006	0.0014	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0110	0.0875	0.0092	0.0311	0.0144	0.0066
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0113	0.0113	0.0113	0.0184	0.0948	0.0165	0.0426	0.0207	0.0143
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0092
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (25 mph), with PM2.5
* File 1, Run 2, Scenario 7.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2022
                                 Month:  Jan.
            Gasoline Fuel Sulfur Content:   30. ppm
              Diesel Fuel Sulfur Content:   15. ppm
                    Particle Size Cutoff:  2.50 Microns
                       Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
```

GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0035	0.0034	0.0034	0.0034	0.0094	------	------	------	0.0142	0.0034
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0201	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0100	------	0.0009
SO4:	0.0004	0.0005	0.0005	0.0005	0.0016	0.0002	0.0003	0.0009	0.0001	0.0006
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0110	0.0875	0.0092	0.0311	0.0143	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0112	0.0113	0.0112	0.0185	0.0948	0.0165	0.0426	0.0207	0.0142
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (30 mph), with PM2.5
* File 1, Run 2, Scenario 8.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

Calendar Year: 2022
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 2.50 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0036	0.0034	0.0034	0.0034	0.0092	------	------	------	0.0142	0.0034
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0201	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0100	------	0.0009

SO4:	0.0003	0.0005	0.0005	0.0005	0.0018	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0110	0.0875	0.0092	0.0311	0.0143	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0112	0.0112	0.0112	0.0185	0.0948	0.0165	0.0426	0.0206	0.0142
SO2:	0.0065	0.0087	0.0115	0.0095	0.0162	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (35 mph), with PM2.5
* File 1, Run 2, Scenario 9.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

Calendar Year: 2022
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 2.50 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0090	------	------	------	0.0142	0.0035
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0201	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0100	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0111	0.0875	0.0092	0.0311	0.0143	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0112	0.0112	0.0112	0.0185	0.0948	0.0165	0.0426	0.0206	0.0142
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (40 mph), with PM2.5
* File 1, Run 2, Scenario 10.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2022
                                    Month:  Jan.
                Gasoline Fuel Sulfur Content:   30. ppm
                  Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff:  2.50 Microns
                          Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
                GVWR:               <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
               Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:     0.0037    0.0035    0.0035    0.0035    0.0090    ------    ------    ------    0.0142    0.0035
           ECARBON:     ------    ------    ------    ------    ------    0.0681    0.0036    0.0201    ------    0.0017
           OCARBON:     ------    ------    ------    ------    ------    0.0192    0.0052    0.0100    ------    0.0009
               SO4:     0.0002    0.0004    0.0004    0.0004    0.0021    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:     0.0039    0.0039    0.0039    0.0039    0.0111    0.0875    0.0092    0.0311    0.0143    0.0065
             Brake:     0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
              Tire:     0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
          Total PM:     0.0112    0.0112    0.0112    0.0112    0.0185    0.0948    0.0165    0.0426    0.0206    0.0142
               SO2:     0.0066    0.0088    0.0115    0.0095    0.0161    0.0029    0.0052    0.0130    0.0033    0.0093
               NH3:     0.0999    0.1013    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0921
 -------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (45 mph), with PM2.5
* File 1, Run 2, Scenario 11.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2022
                                    Month:  Jan.
                Gasoline Fuel Sulfur Content:   30. ppm
                  Diesel Fuel Sulfur Content:   15. ppm
```

```
                    Particle Size Cutoff:  2.50 Microns
                        Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
               Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0037    0.0035    0.0035    0.0035    0.0090    ------    ------    ------    0.0142    0.0035
            ECARBON:    ------    ------    ------    ------    ------    0.0681    0.0036    0.0201    ------    0.0017
            OCARBON:    ------    ------    ------    ------    ------    0.0192    0.0052    0.0100    ------    0.0009
                SO4:    0.0002    0.0004    0.0004    0.0004    0.0021    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:    0.0039    0.0039    0.0039    0.0039    0.0111    0.0875    0.0092    0.0311    0.0143    0.0065
             Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
              Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
          Total PM:    0.0112    0.0112    0.0112    0.0112    0.0185    0.0948    0.0165    0.0426    0.0206    0.0142
               SO2:    0.0066    0.0088    0.0115    0.0095    0.0161    0.0029    0.0052    0.0130    0.0033    0.0093
               NH3:    0.0999    0.1013    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0921
 -------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (50 mph), with PM2.5
* File 1, Run 2, Scenario 12.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #


                          Calendar Year:  2022
                                 Month:  Jan.
             Gasoline Fuel Sulfur Content:   30. ppm
               Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff:  2.50 Microns
                         Reformulated Gas:  Yes


      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
```

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0090	------	------	------	0.0142	0.0035
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0201	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0100	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0111	0.0875	0.0092	0.0311	0.0143	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0112	0.0112	0.0112	0.0185	0.0948	0.0165	0.0426	0.0206	0.0142
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (55 mph), with PM2.5
* File 1, Run 2, Scenario 13.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

Calendar Year: 2022
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 2.50 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0090	------	------	------	0.0142	0.0035
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0201	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0100	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0111	0.0875	0.0092	0.0311	0.0143	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0112	0.0112	0.0112	0.0185	0.0948	0.0165	0.0426	0.0206	0.0142

SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (60 mph), with PM2.5
* File 1, Run 2, Scenario 14.
* # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2022
                                 Month:  Jan.
             Gasoline Fuel Sulfur Content:   30. ppm
               Diesel Fuel Sulfur Content:   15. ppm
                    Particle Size Cutoff:  2.50 Microns
                       Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0090	------	------	------	0.0142	0.0035
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0201	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0100	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0111	0.0875	0.0092	0.0311	0.0143	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0112	0.0112	0.0112	0.0185	0.0948	0.0165	0.0426	0.0206	0.0142
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

```
* # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (65 mph), with PM2.5
* File 1, Run 2, Scenario 15.
* # # # # # # # # # # # # # # # # # # # # # # # #
```

```
                          Calendar Year:  2022
                                 Month:  Jan.
          Gasoline Fuel Sulfur Content:   30. ppm
            Diesel Fuel Sulfur Content:   15. ppm
                 Particle Size Cutoff:  2.50 Microns
                     Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0037    0.0035    0.0035    0.0035    0.0090    ------    ------    ------    0.0142    0.0035
           ECARBON:    ------    ------    ------    ------    ------    0.0681    0.0036    0.0201    ------    0.0017
           OCARBON:    ------    ------    ------    ------    ------    0.0192    0.0052    0.0100    ------    0.0009
               SO4:    0.0002    0.0004    0.0004    0.0004    0.0021    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:    0.0039    0.0039    0.0039    0.0039    0.0111    0.0875    0.0092    0.0311    0.0143    0.0065
             Brake:    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053    0.0053
              Tire:    0.0020    0.0020    0.0020    0.0020    0.0021    0.0020    0.0020    0.0062    0.0010    0.0024
          Total PM:    0.0112    0.0112    0.0112    0.0112    0.0185    0.0948    0.0165    0.0426    0.0206    0.0142
               SO2:    0.0066    0.0088    0.0115    0.0095    0.0161    0.0029    0.0052    0.0130    0.0033    0.0093
               NH3:    0.0999    0.1013    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0921
 -------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 35 mph FREEWAY RAMP Scenario - Winter, with PM2.5
* File 1, Run 2, Scenario 16.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2022
                                 Month:  Jan.
          Gasoline Fuel Sulfur Content:   30. ppm
            Diesel Fuel Sulfur Content:   15. ppm
                 Particle Size Cutoff:  2.50 Microns
                     Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
```

VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0035	0.0035	0.0035	0.0090	------	------	------	0.0142	0.0035
ECARBON:	------	------	------	------	------	0.0681	0.0036	0.0201	------	0.0017
OCARBON:	------	------	------	------	------	0.0192	0.0052	0.0100	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0039	0.0039	0.0039	0.0039	0.0111	0.0875	0.0092	0.0311	0.0143	0.0065
Brake:	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053	0.0053
Tire:	0.0020	0.0020	0.0020	0.0020	0.0021	0.0020	0.0020	0.0062	0.0010	0.0024
Total PM:	0.0112	0.0112	0.0112	0.0112	0.0185	0.0948	0.0165	0.0426	0.0206	0.0142
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

* #
* 2022 DEFAULT SPEED - Winter, with PM10
* File 1, Run 2, Scenario 17.
* #

Calendar Year: 2022
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0039	0.0037	0.0037	0.0037	0.0101	------	------	------	0.0205	0.0037
ECARBON:	------	------	------	------	------	0.0740	0.0040	0.0219	------	0.0019
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0109	------	0.0009
SO4:	0.0003	0.0005	0.0005	0.0005	0.0019	0.0002	0.0003	0.0009	0.0001	0.0005

Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0120	0.0951	0.0099	0.0337	0.0206	0.0071
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0249	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0330	0.1156	0.0305	0.0711	0.0371	0.0291
SO2:	0.0065	0.0087	0.0115	0.0095	0.0162	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 Idle Scenario - Winter (multiply g/mi by 2.5 mph to get g/hr), with PM10
* File 1, Run 2, Scenario 18.
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

```
                          Calendar Year:  2022
                                 Month:  Jan.
            Gasoline Fuel Sulfur Content:   30. ppm
              Diesel Fuel Sulfur Content:   15. ppm
                    Particle Size Cutoff: 10.00 Microns
                       Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0036	0.0036	0.0036	0.0106	------	------	------	0.0205	0.0036
ECARBON:	------	------	------	------	------	0.0740	0.0040	0.0219	------	0.0019
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0109	------	0.0009
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0119	0.0950	0.0099	0.0337	0.0207	0.0071
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0249	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0330	0.1156	0.0305	0.0711	0.0372	0.0291
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0092
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
```

```
* 2022 - Winter (5 mph), with PM10
* File 1, Run 2, Scenario 19.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2022
                                    Month:  Jan.
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                      Particle Size Cutoff: 10.00 Microns
                          Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
-----------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0037    0.0036    0.0036    0.0036    0.0106    ------    ------    ------    0.0205    0.0036
           ECARBON:    ------    ------    ------    ------    ------    0.0740    0.0040    0.0219    ------    0.0019
           OCARBON:    ------    ------    ------    ------    ------    0.0209    0.0057    0.0109    ------    0.0009
               SO4:    0.0005    0.0006    0.0006    0.0006    0.0013    0.0002    0.0003    0.0009    0.0002    0.0006
  Total Exhaust PM:    0.0042    0.0042    0.0042    0.0042    0.0119    0.0950    0.0099    0.0337    0.0207    0.0071
             Brake:    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125
              Tire:    0.0080    0.0080    0.0080    0.0080    0.0085    0.0080    0.0080    0.0249    0.0040    0.0095
          Total PM:    0.0247    0.0247    0.0247    0.0247    0.0330    0.1156    0.0305    0.0711    0.0372    0.0291
               SO2:    0.0065    0.0087    0.0115    0.0095    0.0163    0.0029    0.0052    0.0130    0.0033    0.0092
               NH3:    0.0999    0.1013    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0921
-----------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (10 mph), with PM10
* File 1, Run 2, Scenario 20.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2022
                                    Month:  Jan.
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                      Particle Size Cutoff: 10.00 Microns
```

```
                    Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
             GVWR:                 <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
            GASPM:    0.0037    0.0036    0.0036    0.0036    0.0106    ------    ------    ------    0.0205    0.0036
          ECARBON:    ------    ------    ------    ------    ------    0.0740    0.0040    0.0219    ------    0.0019
          OCARBON:    ------    ------    ------    ------    ------    0.0209    0.0057    0.0109    ------    0.0009
              SO4:    0.0005    0.0006    0.0006    0.0006    0.0013    0.0002    0.0003    0.0009    0.0002    0.0006
   Total Exhaust PM:    0.0042    0.0042    0.0042    0.0042    0.0119    0.0950    0.0099    0.0337    0.0207    0.0071
            Brake:    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125
             Tire:    0.0080    0.0080    0.0080    0.0080    0.0085    0.0080    0.0080    0.0249    0.0040    0.0095
         Total PM:    0.0247    0.0247    0.0247    0.0247    0.0330    0.1156    0.0305    0.0711    0.0372    0.0291
              SO2:    0.0065    0.0087    0.0115    0.0095    0.0163    0.0029    0.0052    0.0130    0.0033    0.0092
              NH3:    0.0999    0.1013    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0921
 -------------------------------------------------------------------------------------------------------------------


* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (15 mph), with PM10
* File 1, Run 2, Scenario 21.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2022
                                  Month:  Jan.
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff: 10.00 Microns
                         Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
             GVWR:                 <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
 -------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
```

GASPM:	0.0037	0.0036	0.0036	0.0036	0.0106	------	------	------	0.0205	0.0036
ECARBON:	------	------	------	------	------	0.0740	0.0040	0.0219	------	0.0019
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0109	------	0.0009
SO4:	0.0005	0.0006	0.0006	0.0006	0.0013	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0119	0.0950	0.0099	0.0337	0.0207	0.0071
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0249	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0330	0.1156	0.0305	0.0711	0.0372	0.0291
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0092
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

----

* #
* 2022 - Winter (20 mph), with PM10
* File 1, Run 2, Scenario 22.
* #

Calendar Year: 2022
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0037	0.0036	0.0036	0.0036	0.0105	------	------	------	0.0205	0.0036
ECARBON:	------	------	------	------	------	0.0740	0.0040	0.0219	------	0.0019
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0109	------	0.0009
SO4:	0.0005	0.0006	0.0006	0.0006	0.0014	0.0002	0.0003	0.0009	0.0002	0.0006
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0119	0.0950	0.0099	0.0337	0.0207	0.0071
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0249	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0330	0.1156	0.0305	0.0711	0.0372	0.0291
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0092

NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

---

* #
* 2022 - Winter (25 mph), with PM10
* File 1, Run 2, Scenario 23.
* #

Calendar Year: 2022
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0038	0.0037	0.0037	0.0037	0.0103	------	------	------	0.0205	0.0037
ECARBON:	------	------	------	------	------	0.0740	0.0040	0.0219	------	0.0019
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0109	------	0.0009
SO4:	0.0004	0.0005	0.0005	0.0005	0.0016	0.0002	0.0003	0.0009	0.0001	0.0006
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0119	0.0950	0.0099	0.0337	0.0206	0.0071
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0249	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0330	0.1156	0.0305	0.0711	0.0372	0.0291
SO2:	0.0065	0.0087	0.0115	0.0095	0.0163	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

---

* #
* 2022 - Winter (30 mph), with PM10
* File 1, Run 2, Scenario 24.
* #

Calendar Year: 2022

```
                                 Month:  Jan.
                Gasoline Fuel Sulfur Content:   30. ppm
                  Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff: 10.00 Microns
                           Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
-------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
               Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0039    0.0037    0.0037    0.0037    0.0101    ------    ------    ------    0.0205    0.0037
           ECARBON:    ------    ------    ------    ------    ------    0.0740    0.0040    0.0219    ------    0.0019
           OCARBON:    ------    ------    ------    ------    ------    0.0209    0.0057    0.0109    ------    0.0009
               SO4:    0.0003    0.0005    0.0005    0.0005    0.0018    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:    0.0042    0.0042    0.0042    0.0042    0.0119    0.0950    0.0099    0.0337    0.0206    0.0071
             Brake:    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125
              Tire:    0.0080    0.0080    0.0080    0.0080    0.0085    0.0080    0.0080    0.0249    0.0040    0.0095
          Total PM:    0.0247    0.0247    0.0247    0.0247    0.0330    0.1156    0.0305    0.0711    0.0371    0.0291
               SO2:    0.0065    0.0087    0.0115    0.0095    0.0162    0.0029    0.0052    0.0130    0.0033    0.0093
               NH3:    0.0999    0.1013    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0921
-------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (35 mph), with PM10
* File 1, Run 2, Scenario 25.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                             Calendar Year:  2022
                                 Month:  Jan.
                Gasoline Fuel Sulfur Content:   30. ppm
                  Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff: 10.00 Microns
                           Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
```

VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0099	------	------	------	0.0205	0.0038
ECARBON:	------	------	------	------	------	0.0740	0.0040	0.0219	------	0.0019
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0109	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0120	0.0950	0.0099	0.0337	0.0206	0.0071
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0249	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0330	0.1156	0.0305	0.0711	0.0371	0.0291
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (40 mph), with PM10
* File 1, Run 2, Scenario 26.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                 Calendar Year:  2022
                         Month:  Jan.
     Gasoline Fuel Sulfur Content:   30. ppm
       Diesel Fuel Sulfur Content:   15. ppm
         Particle Size Cutoff: 10.00 Microns
             Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0099	------	------	------	0.0205	0.0038
ECARBON:	------	------	------	------	------	0.0740	0.0040	0.0219	------	0.0019
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0109	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0120	0.0950	0.0099	0.0337	0.0206	0.0071

Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0249	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0330	0.1156	0.0305	0.0711	0.0371	0.0291
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

---

* #
* 2022 - Winter (45 mph), with PM10
* File 1, Run 2, Scenario 27.
* #

Calendar Year: 2022
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	---	---	---	---	---	---	---	---	---	---
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0099	------	------	------	0.0205	0.0038
ECARBON:	------	------	------	------	------	0.0740	0.0040	0.0219	------	0.0019
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0109	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0120	0.0950	0.0099	0.0337	0.0206	0.0071
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0249	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0330	0.1156	0.0305	0.0711	0.0371	0.0291
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

---

* #
* 2022 - Winter (50 mph), with PM10

```
* File 1, Run 2, Scenario 28.
* # # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2022
                                    Month:  Jan.
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff: 10.00 Microns
                         Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:              <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.2610    0.4386    0.1723              0.0371    0.0000    0.0015    0.0858    0.0036    1.0000
-------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
              Lead:    0.0000    0.0000    0.0000    0.0000    0.0000    ------    ------    ------    0.0000    0.0000
             GASPM:    0.0040    0.0038    0.0038    0.0038    0.0099    ------    ------    ------    0.0205    0.0038
           ECARBON:    ------    ------    ------    ------    ------    0.0740    0.0040    0.0219    ------    0.0019
           OCARBON:    ------    ------    ------    ------    ------    0.0209    0.0057    0.0109    ------    0.0009
               SO4:    0.0002    0.0004    0.0004    0.0004    0.0021    0.0002    0.0003    0.0009    0.0001    0.0005
  Total Exhaust PM:    0.0042    0.0042    0.0042    0.0042    0.0120    0.0950    0.0099    0.0337    0.0206    0.0071
             Brake:    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125    0.0125
              Tire:    0.0080    0.0080    0.0080    0.0080    0.0085    0.0080    0.0080    0.0249    0.0040    0.0095
          Total PM:    0.0247    0.0247    0.0247    0.0247    0.0330    0.1156    0.0305    0.0711    0.0371    0.0291
               SO2:    0.0066    0.0088    0.0115    0.0095    0.0161    0.0029    0.0052    0.0130    0.0033    0.0093
               NH3:    0.0999    0.1013    0.1017    0.1014    0.0451    0.0068    0.0068    0.0270    0.0113    0.0921
-------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (55 mph), with PM10
* File 1, Run 2, Scenario 29.
* # # # # # # # # # # # # # # # # # # # # # # # # # #

                            Calendar Year:  2022
                                    Month:  Jan.
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff: 10.00 Microns
                         Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0099	------	------	------	0.0205	0.0038
ECARBON:	------	------	------	------	------	0.0740	0.0040	0.0219	------	0.0019
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0109	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0120	0.0950	0.0099	0.0337	0.0206	0.0071
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0249	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0330	0.1156	0.0305	0.0711	0.0371	0.0291
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

* #
* 2022 - Winter (60 mph), with PM10
* File 1, Run 2, Scenario 30.
* #

Calendar Year: 2022
Month: Jan.
Gasoline Fuel Sulfur Content: 30. ppm
Diesel Fuel Sulfur Content: 15. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0099	------	------	------	0.0205	0.0038

ECARBON:	------	------	------	------	------	0.0740	0.0040	0.0219	------	0.0019
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0109	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0120	0.0950	0.0099	0.0337	0.0206	0.0071
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0249	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0330	0.1156	0.0305	0.0711	0.0371	0.0291
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 - Winter (65 mph), with PM10
* File 1, Run 2, Scenario 31.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                          Calendar Year:  2022
                                 Month:  Jan.
              Gasoline Fuel Sulfur Content:   30. ppm
                Diesel Fuel Sulfur Content:   15. ppm
                     Particle Size Cutoff: 10.00 Microns
                         Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
	------	------	------	------	------	------	------	------	------	------
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0099	------	------	------	0.0205	0.0038
ECARBON:	------	------	------	------	------	0.0740	0.0040	0.0219	------	0.0019
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0109	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0120	0.0950	0.0099	0.0337	0.0206	0.0071
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0249	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0330	0.1156	0.0305	0.0711	0.0371	0.0291
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

```
------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2022 35 mph FREEWAY RAMP Scenario - Winter, with PM10
* File 1, Run 2, Scenario 32.
* # # # # # # # # # # # # # # # # # # # # # # # # #

                              Calendar Year:  2022
                                      Month:  Jan.
               Gasoline Fuel Sulfur Content:   30. ppm
                 Diesel Fuel Sulfur Content:   15. ppm
                       Particle Size Cutoff: 10.00 Microns
                           Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.2610	0.4386	0.1723		0.0371	0.0000	0.0015	0.0858	0.0036	1.0000

Composite Emission Factors (g/mi):

	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	------	------	------	0.0000	0.0000
GASPM:	0.0040	0.0038	0.0038	0.0038	0.0099	------	------	------	0.0205	0.0038
ECARBON:	------	------	------	------	------	0.0740	0.0040	0.0219	------	0.0019
OCARBON:	------	------	------	------	------	0.0209	0.0057	0.0109	------	0.0009
SO4:	0.0002	0.0004	0.0004	0.0004	0.0021	0.0002	0.0003	0.0009	0.0001	0.0005
Total Exhaust PM:	0.0042	0.0042	0.0042	0.0042	0.0120	0.0950	0.0099	0.0337	0.0206	0.0071
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0085	0.0080	0.0080	0.0249	0.0040	0.0095
Total PM:	0.0247	0.0247	0.0247	0.0247	0.0330	0.1156	0.0305	0.0711	0.0371	0.0291
SO2:	0.0066	0.0088	0.0115	0.0095	0.0161	0.0029	0.0052	0.0130	0.0033	0.0093
NH3:	0.0999	0.1013	0.1017	0.1014	0.0451	0.0068	0.0068	0.0270	0.0113	0.0921

```
*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/6/2012 3:47:50 PM
** File: F:\2975 FirstLight\Microscale\Worst\49 Rte 44 & Orchard LOS&ADT\2012EXAM.ou2
**
*********************************************
```

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: FirstLight-Taunton-Rt 44 & Orchard St- Existing AM RUN: CAL3QHC RUN

DATE : 12/ 6/12
TIME : 15:47:48

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE	VPH	EF	H	W	V/C	QUEUE
	*	X1	Y1	X2	Y2	*	(M)								
	*	(DEG)	(G/MI)	(M)	(M)		(VEH)								
1. EBTL	*	238118.14	850750.62	238199.34	850742.50	*	82.	96.	AG	1348.	8.7	0.0	13.4		
2. EBTLQ	*	238199.34	850742.50	238134.52	850749.00	*	65.	276.	AG	130.	100.0	0.0	7.4	0.79	10.9
3. EBRL	*	238167.22	850742.50	238197.22	850740.06	*	30.	95.	AG						

153. 8.7 0.0 9.0
4. EBRLQ * 238197.22 850740.06 238182.48 850741.25 * 15. 275. AG
65. 100.0 0.0 3.0 0.18 2.5
5. WBLT * 238300.23 850741.88 238230.86 850748.50 * 70. 275. AG
712. 8.7 0.0 13.4
6. WBLTQ * 238230.86 850748.50 238272.20 850744.56 * 42. 95. AG
157. 100.0 0.0 7.4 0.54 6.9
7. WBRL * 238299.03 850746.69 238231.45 850754.00 * 68. 276. AG
42. 8.7 0.0 9.4
8. WBRLQ * 238231.45 850754.00 238235.34 850753.56 * 4. 97. AG
63. 100.0 0.0 3.4 0.05 0.7
9. NBLL * 238225.09 850675.19 238217.52 850730.06 * 55. 352. AG
353. 8.7 0.0 9.7
10. NBLLQ * 238217.52 850730.06 238225.00 850675.88 * 55. 172. AG
95. 100.0 0.0 3.7 0.83 9.1
11. NBTR * 238229.05 850675.50 238221.16 850730.06 * 55. 352. AG
114. 8.7 0.0 10.0
12. NBTRQ * 238221.16 850730.06 238223.84 850711.44 * 19. 172. AG
111. 100.0 0.0 4.0 0.56 3.1
13. SBLL * 238200.86 850837.00 238209.34 850762.75 * 75. 173. AG
90. 8.7 0.0 9.7
14. SBLLQ * 238209.34 850762.75 238207.69 850777.19 * 15. 353. AG
109. 100.0 0.0 3.7 0.38 2.4
15. SBTR * 238200.25 850836.69 238204.80 850763.69 * 73. 176. AG
172. 8.7 0.0 9.7
16. SBTRQ * 238204.80 850763.69 238189.84 851003.75 * 241. 356. AG
118. 100.0 0.0 3.7 1.56 40.1
17. EBOUT * 238232.06 850738.25 238299.34 850731.56 * 68. 96. AG
1419. 8.7 0.0 13.4
18. WBOUT * 238198.44 850754.25 238133.30 850759.44 * 65. 275. AG
1168. 8.7 0.0 13.4
19. NBOUT * 238213.58 850762.50 238204.19 850836.12 * 74. 353. AG
175. 8.7 0.0 9.4
20. SBOUT * 238209.64 850730.62 238221.16 850675.50 * 56. 168. AG
222. 8.7 0.0 9.0
21. EBL * 238199.95 850742.50 238213.77 850761.88 * 24. 35. AG
46. 9.7 0.0 9.0
22. EBT * 238199.77 850742.12 238231.58 850738.50 * 32. 97. AG
1302. 8.7 0.0 12.0
23. EBR * 238197.95 850740.06 238209.58 850731.88 * 14. 125. AG

153. 10.8 0.0 9.0
24. WBL * 238229.97 850749.00 238209.77 850732.31 * 26. 230. AG
15. 9.7 0.0 9.0
25. WBT * 238230.06 850748.75 238197.77 850754.25 * 33. 280. AG
697. 8.7 0.0 12.0
26. WBR * 238230.81 850753.88 238213.69 850760.75 * 18. 292. AG
42. 10.8 0.0 9.0
27. NBL * 238217.69 850731.38 238199.09 850754.06 * 29. 321. AG
353. 9.7 0.0 9.0
28. NBT * 238221.11 850730.94 238214.62 850761.75 * 31. 348. AG
87. 8.7 0.0 9.0
29. NBR * 238221.39 850730.06 238232.73 850737.88 * 14. 55. AG
27. 10.8 0.0 9.0
30. SBL * 238209.11 850762.25 238229.58 850738.81 * 31. 139. AG
90. 9.7 0.0 9.0
31. SBT * 238205.02 850763.12 238209.02 850733.38 * 30. 172. AG
54. 8.7 0.0 9.0
32. SBR * 238204.53 850762.81 238192.25 850754.06 * 15. 235. AG
118. 10.8 0.0 9.0

FF

JOB: FirstLight-Taunton-Rt 44 & Orchard St- Existing AM RUN: CAL3QHC
RUN

DATE : 12/ 6/12
TIME : 15:47:48

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. EBTLQ	*	120	58	6.0	1348	1900	50.22	3	3
4. EBRLQ	*	120	58	6.0	153	1900	50.22	3	3
6. WBLTQ	*	120	70	6.0	712	1900	50.22	3	3
8. WBRLQ	*	120	56	6.0	42	1900	50.22	3	3
10. NBLLQ	*	120	85	6.0	353	1900	50.22	3	3

12. NBTRQ	*	120	99	6.0	114	1900	50.22	3	3
14. SBLLQ	*	120	97	6.0	90	1900	50.22	3	3
16. SBTRQ	*	120	105	6.0	172	1900	50.22	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. R_001	*	238196.62	850836.38	1.8	*
2. R_002	*	238196.92	850831.56	1.8	*
3. R_003	*	238196.62	850826.12	1.8	*
4. R_004	*	238196.92	850820.31	1.8	*
5. R_005	*	238196.92	850814.25	1.8	*
6. R_006	*	238197.52	850809.12	1.8	*
7. R_007	*	238199.05	850801.56	1.8	*
8. R_008	*	238198.44	850795.50	1.8	*
9. R_009	*	238199.95	850788.25	1.8	*
10. R_010	*	238201.45	850782.44	1.8	*
11. R_011	*	238201.77	850776.12	1.8	*
12. R_012	*	238200.25	850770.62	1.8	*
13. R_013	*	238196.92	850764.88	1.8	*
14. R_014	*	238191.77	850762.19	1.8	*
15. R_015	*	238184.80	850761.56	1.8	*
16. R_016	*	238176.62	850761.56	1.8	*
17. R_017	*	238169.66	850762.19	1.8	*
18. R_018	*	238161.77	850763.38	1.8	*
19. R_019	*	238155.41	850764.88	1.8	*
20. R_020	*	238208.12	850837.00	1.8	*
21. R_021	*	238207.22	850832.19	1.8	*
22. R_022	*	238208.44	850824.88	1.8	*
23. R_023	*	238209.34	850820.94	1.8	*
24. R_024	*	238209.95	850814.88	1.8	*
25. R_025	*	238210.55	850807.31	1.8	*
26. R_026	*	238210.86	850800.62	1.8	*
27. R_027	*	238211.77	850794.56	1.8	*

FF

JOB: FirstLight-Taunton-Rt 44 & Orchard St- Existing AM RUN: CAL3QHC
RUN

RECEPTOR	COORDINATES (M) X	Y	Z
28. R_028	238212.98	850785.50	1.8
29. R_029	238214.48	850776.69	1.8
30. R_030	238216.61	850768.81	1.8
31. R_031	238220.86	850762.75	1.8
32. R_032	238225.41	850759.12	1.8
33. R_033	238232.38	850757.62	1.8
34. R_034	238239.95	850756.69	1.8
35. R_035	238249.64	850756.44	1.8
36. R_036	238257.22	850755.19	1.8
37. R_037	238266.31	850754.56	1.8
38. R_038	238274.19	850754.25	1.8
39. R_039	238282.38	850754.00	1.8
40. R_040	238289.34	850753.38	1.8
41. R_041	238295.41	850753.38	1.8
42. R_042	238299.64	850752.75	1.8
43. R_043	238299.34	850724.56	1.8
44. R_044	238292.06	850725.50	1.8
45. R_045	238284.19	850726.44	1.8
46. R_046	238275.70	850727.31	1.8
47. R_047	238267.81	850728.25	1.8
48. R_048	238261.16	850729.44	1.8
49. R_049	238254.48	850730.62	1.8
50. R_050	238247.81	850731.56	1.8
51. R_051	238240.55	850731.88	1.8
52. R_052	238234.48	850730.94	1.8
53. R_053	238229.95	850728.25	1.8
54. R_054	238227.52	850725.19	1.8
55. R_055	238226.31	850719.12	1.8
56. R_056	238226.92	850712.19	1.8
57. R_057	238228.44	850700.38	1.8
58. R_058	238229.05	850695.50	1.8
59. R_059	238229.95	850690.06	1.8
60. R_060	238230.55	850685.19	1.8
61. R_061	238231.16	850680.06	1.8
62. R_062	238232.06	850675.50	1.8
63. R_063	238217.52	850675.50	1.8
64. R_064	238216.61	850680.62	1.8

65. R_065	*	238215.09	850687.00	1.8	*
66. R_066	*	238213.89	850695.19	1.8	*
67. R_067	*	238212.98	850704.31	1.8	*
68. R_068	*	238211.45	850710.94	1.8	*
69. R_069	*	238208.73	850719.75	1.8	*
70. R_070	*	238205.70	850726.12	1.8	*
71. R_071	*	238202.06	850731.56	1.8	*
72. R_072	*	238194.80	850734.88	1.8	*
73. R_073	*	238186.92	850736.44	1.8	*
74. R_074	*	238179.95	850737.00	1.8	*
75. R_075	*	238171.77	850736.12	1.8	*
76. R_076	*	238164.50	850735.19	1.8	*
77. R_077	*	238227.22	850707.00	1.8	*
78. R_078	*	238146.92	850739.44	1.8	*
79. R_079	*	238138.44	850740.06	1.8	*

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RECEPTOR	*	COORDINATES (M) X	Y	Z	*
80. R_080	*	238132.08	850740.38	1.8	*
81. R_081	*	238126.62	850741.56	1.8	*
82. R_082	*	238121.17	850741.88	1.8	*
83. R_083	*	238117.23	850741.88	1.8	*
84. R_084	*	238117.53	850767.94	1.8	*
85. R_085	*	238122.08	850768.25	1.8	*
86. R_086	*	238127.83	850767.00	1.8	*
87. R_087	*	238131.77	850766.38	1.8	*
88. R_088	*	238135.11	850766.12	1.8	*

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

```
 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC1   REC2   REC3   REC4   REC5   REC6   REC7   REC8   REC9   REC10  REC11  REC12  REC13  REC14  REC15  REC16
 REC17  REC18  REC19  REC20

 ------*-----------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.5    0.5    0.4    0.4    0.5    0.5    0.6    0.6    0.7    0.9    0.9    0.6    0.3    0.2    0.1    0.1
   0.1     0.     0.    0.2
  10.  *    0.6    0.6    0.5    0.6    0.6    0.6    0.7    0.6    0.7    0.9    0.9    0.7    0.5    0.3    0.2    0.1
  0.1    0.1    0.1    0.1
  20.  *    0.5    0.5    0.5    0.6    0.6    0.6    0.7    0.6    0.7    0.8    0.8    0.6    0.4    0.3    0.2    0.2
  0.1    0.1    0.1     0.
  30.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.5    0.6    0.7    0.7    0.5    0.4    0.2    0.2    0.1
  0.1    0.1    0.1     0.
  40.  *    0.4    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.6    0.5    0.2    0.2    0.1
  0.1    0.1    0.1     0.
  50.  *    0.4    0.4    0.5    0.4    0.4    0.4    0.5    0.5    0.5    0.5    0.5    0.6    0.4    0.3    0.1    0.2
  0.2    0.1    0.1     0.
  60.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.4    0.5    0.4    0.4    0.6    0.4    0.3    0.2    0.2
  0.2    0.2    0.1     0.
  70.  *    0.4    0.4    0.3    0.3    0.3    0.3    0.4    0.3    0.4    0.4    0.5    0.6    0.4    0.2    0.3    0.3
  0.2    0.2    0.1     0.
  80.  *    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.6    0.4    0.2    0.3    0.4
  0.3    0.2    0.2     0.
  90.  *    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.6    0.6    0.4    0.4    0.4    0.5
  0.5    0.4    0.2     0.
 100.  *    0.3    0.5    0.3    0.3    0.3    0.3    0.4    0.3    0.4    0.4    0.6    0.8    0.5    0.5    0.6    0.9
 0.9    0.9    0.8     0.
 110.  *    0.4    0.5    0.4    0.4    0.3    0.4    0.5    0.4    0.5    0.7     1.    0.9    0.6    0.8    0.8    0.9
 1.    1.1    0.9     0.
 120.  *    0.4    0.5    0.4    0.4    0.4    0.4    0.5    0.6    0.8    0.9    1.1     1.    0.6    0.6    0.9    0.9
 0.9     1.    0.9     0.
 130.  *    0.5    0.6    0.5    0.6    0.7    0.7    0.8    0.8    0.9    1.1    1.2    0.9    0.5    0.8    0.9    0.8
 1.    0.8    0.8     0.
 140.  *    0.7    0.8    0.8    0.8    0.7    0.7    0.8    0.7    0.9    1.2    1.2    0.7    0.5    0.7    0.8     1.
 0.9    0.9    0.9     0.
 150.  *    0.9    0.9    0.8    0.8    0.7    0.7    0.8    0.9     1.    1.2    1.1    0.5    0.6    0.9    0.9     1.
```

```
 0.9    0.8    0.7    0.2
 160.  *    0.7    0.7    0.6    0.6    0.6    0.7    0.8    0.8     1.    1.2     1.    0.5    0.5    0.7    0.8    0.7
 0.8    0.7    0.7    0.2
 170.  *    0.6    0.5    0.5    0.6    0.5    0.5    0.7    0.7    0.8     1.    0.9    0.5    0.7    0.7    0.8    0.7
 0.7    0.7    0.7    0.2
 180.  *    0.4    0.4    0.3    0.3    0.4    0.6    0.6    0.6    0.7    0.8    0.8    0.6    0.6    0.8    0.7    0.7
 0.7    0.7    0.7    0.3
 190.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.4    0.6    0.5    0.4    0.6    0.8    0.7    0.7
 0.7    0.7    0.7    0.5
 200.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.3    0.5    0.7    0.7    0.7    0.7
 0.7    0.7    0.7    0.8
 210.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.5    0.6    0.7    0.7    0.7    0.8
 0.8    0.7    0.7    0.8
 220.  *     0.    0.1    0.2    0.2    0.3    0.3    0.3    0.3    0.3    0.4    0.5    0.6    0.7    0.7    0.8    0.9
 0.9    0.9    0.7    0.6

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.9    0.9    0.8    0.8    0.7    0.7    0.8    0.9     1.    1.2    1.2     1.    0.7    0.9    0.9     1.
 1.    1.1    0.9    0.8
 DEGR. *    150    150    140    140    130    130    130    150    150    140    130    120    170    150    120    140
 110    110    110    200
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

```
WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC1   REC2   REC3   REC4   REC5   REC6   REC7   REC8   REC9   REC10  REC11  REC12  REC13  REC14  REC15  REC16
REC17  REC18  REC19  REC20

------*-------------------------------------------------------------------------------------------------------------------
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---------------------
230.  *     0.     0.     0.     0.    0.1    0.2    0.3    0.3    0.3    0.4    0.5    0.6    0.7    0.9    0.9    0.9
0.9    0.9    0.7    0.3
240.  *     0.     0.     0.     0.     0.     0.     0.2    0.2    0.3    0.3    0.5    0.6    0.7    0.9     1.     1.
1.    0.8    0.7    0.2
250.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.4    0.5    0.8    0.9    0.9     1.
0.8    0.7    0.6    0.2
260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.4    0.5    0.8    0.8    0.8
0.8    0.5    0.4    0.2
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.5    0.6    0.6
0.5    0.4    0.2    0.2
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.3
0.3    0.2    0.1    0.2
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2
0.2    0.1    0.1    0.2
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1
0.1    0.1     0.    0.3
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
0.1     0.     0.    0.3
320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
0.1     0.     0.    0.3
330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.    0.3
340.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.1     0.     0.     0.     0.
0.     0.     0.    0.4
350.  *    0.3    0.3    0.3    0.3    0.2    0.3    0.4    0.4    0.4    0.6    0.6    0.4    0.2    0.1     0.     0.
0.     0.     0.    0.3
360.  *    0.5    0.5    0.4    0.4    0.5    0.5    0.6    0.6    0.7    0.9    0.9    0.6    0.3    0.2    0.1    0.1
0.1     0.     0.    0.2

------*-------------------------------------------------------------------------------------------------------------------
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MAX   *    0.9    0.9    0.8    0.8    0.7    0.7    0.8    0.9     1.    1.2    1.2     1.    0.8    0.9     1.     1.
1.    1.1    0.9    0.8
DEGR. *    150    150    140    140    130    130    130    150    150    140    130    120    250    150    240    140
110    110    110    200

      MODEL RESULTS
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```

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
.	* 0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.
10.	* 0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
40.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MAX	* 0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.
DEGR.	* 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
50.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
60.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
70.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
80.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.2	0.1	0.1	0.	0.	0.	0.
100.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.3	0.4	0.5	0.5	0.2	0.1	0.1	0.1	0.
110.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.3	0.3	0.5	0.7	0.7	0.6	0.5	0.4	0.3	0.1	0.1	0.
120.	*	0.	0.	0.	0.	0.	0.	0.	0.3	0.3	0.5	0.7	0.9	0.8	0.8	0.7	0.6	0.3	0.3	0.1	0.1
130.	*	0.	0.	0.	0.	0.1	0.3	0.3	0.3	0.4	0.5	0.6	1.	1.	0.9	0.8	0.7	0.5	0.3	0.3	0.1
140.	*	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.6	0.6	0.7	1.	0.9	0.8	0.8	0.5	0.4	0.3	0.1
150.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.4	0.5	0.6	0.9	0.8	0.8	0.8	0.6	0.4	0.4	0.2
160.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.3	0.3	0.4	0.5	0.9	0.8	0.8	0.8	0.7	0.4	0.4	0.3
170.	*	0.2	0.2	0.2	0.3	0.2	0.2	0.4	0.4	0.4	0.4	0.5	0.5	0.8	0.8	0.8	0.8	0.7	0.4	0.4	0.4
180.	*	0.4	0.3	0.4	0.3	0.4	0.5	0.5	0.5	0.4	0.4	0.5	0.6	0.8	0.8	0.8	0.8	0.8	0.5	0.4	0.4
190.	*	0.6	0.6	0.6	0.4	0.4	0.5	0.5	0.6	0.4	0.4	0.4	0.6	0.9	0.9	0.8	0.8	0.8	0.6	0.4	0.4

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200.  *    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.7    0.7    0.2    0.3    0.5    0.8     1.    0.9    0.8
0.8    0.7    0.4    0.4
210.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.8    0.8    0.4    0.4    0.4    0.4    0.9    0.9    0.9
0.8    0.7    0.5    0.4
220.  *    0.7    0.8    0.8    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.6    0.4    0.4    0.8    1.1    0.9
0.9    0.8    0.5    0.4
230.  *    0.5    0.4    0.6    0.5    0.6    0.5    0.5    0.5     1.    0.7    0.5    0.6    0.4    0.7    0.8     1.
0.9    0.9    0.6    0.5
240.  *    0.3    0.3    0.3    0.3    0.4    0.4    0.5    0.5    0.9     1.    0.6    0.5    0.6    0.8    0.8    0.8
0.9    0.8    0.7    0.6
250.  *    0.3    0.2    0.2    0.2    0.2    0.2    0.3    0.5    0.8    0.9    0.7    0.7    0.7    0.7    0.8    1.1
0.9    0.8    0.9    0.7
260.  *    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.6    0.8    0.6    0.7    0.7    0.8    0.7    0.8
1.    0.9    0.9    0.9
270.  *    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.7    0.6    0.5    0.5    0.4    0.4    0.7
0.8    0.7    0.7    0.6
280.  *    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.5    0.3    0.3    0.5    0.3    0.2    0.2
0.3    0.2    0.2    0.2
290.  *    0.3    0.2    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.5    0.3    0.2    0.2    0.2    0.1    0.1
0.1    0.1    0.1    0.1
300.  *    0.3    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.5    0.4    0.2    0.2    0.2    0.1    0.1
0.1    0.1    0.1    0.1
310.  *    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.4    0.4    0.3    0.2    0.1    0.1    0.1
0.1    0.1    0.1    0.1
320.  *    0.3    0.4    0.4    0.4    0.4    0.5    0.4    0.4    0.4    0.4    0.4    0.3    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
330.  *    0.4    0.4    0.4    0.4    0.4    0.5    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.1    0.1    0.1
0.1    0.1    0.1    0.1
340.  *    0.4    0.5    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.1    0.1    0.1
0.1    0.1     0.     0.
350.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.1    0.1    0.1     0.
0.     0.     0.     0.
360.  *    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1     0.     0.     0.     0.
0.     0.     0.     0.

------*-------------------------------------------------------------------------------------------------------------
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MAX   *    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.8     1.     1.    0.7     1.     1.     1.    1.1    1.1
1.    0.9    0.9    0.9
DEGR. *    200    200    200    200    200    210    200    210    230    240    120    130    130    200    220    250
```

260 230 250 260

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	*	0.	0.	0.3	0.5	0.5	0.6	0.7	0.8	0.8	0.8	0.8	0.7	0.6	0.5	0.5	0.4	0.5	0.5	0.5	0.6
10.	*	0.	0.	0.1	0.5	0.5	0.5	0.7	0.8	0.8	0.8	0.8	0.7	0.6	0.5	0.3	0.3	0.2	0.2	0.2	0.2
20.	*	0.	0.	0.1	0.5	0.5	0.5	0.6	0.7	0.8	0.8	0.8	0.8	0.6	0.6	0.4	0.3	0.3	0.3	0.3	0.2
30.	*	0.	0.	0.	0.5	0.5	0.5	0.5	0.7	0.8	0.8	0.8	0.8	0.6	0.6	0.5	0.5	0.3	0.3	0.3	0.3
40.	*	0.	0.	0.	0.3	0.5	0.5	0.5	0.6	0.7	0.8	0.8	0.8	0.6	0.6	0.5	0.5	0.4	0.3	0.3	0.1
50.	*	0.	0.	0.	0.3	0.5	0.6	0.6	0.7	0.8	1.	1.	0.9	0.7	0.6	0.5	0.4	0.3	0.1	0.1	0.1
60.	*	0.	0.	0.	0.2	0.4	0.6	0.6	0.6	0.8	1.	1.	0.8	0.7	0.6	0.5	0.4	0.1	0.1	0.1	0.1
70.	*	0.	0.	0.	0.2	0.4	0.5	0.6	0.7	0.7	0.8	0.9	0.9	0.6	0.5	0.4	0.2	0.1	0.1	0.	0.
80.	*	0.	0.	0.	0.2	0.3	0.4	0.5	0.7	0.7	0.8	0.9	0.8	0.6	0.4	0.2	0.1	0.	0.	0.	0.
90.	*	0.	0.	0.	0.1	0.3	0.4	0.4	0.5	0.6	0.7	0.8	0.6	0.3	0.2	0.1	0.	0.	0.	0.	0.

```
100.  *     0.     0.     0.     0.1    0.2    0.2    0.3    0.4    0.5    0.5    0.5    0.3    0.1    0.1     0.     0.
0.     0.     0.     0.
110.  *     0.     0.     0.     0.     0.1    0.1    0.2    0.2    0.3    0.3    0.3    0.2     0.     0.     0.     0.
0.     0.     0.     0.
120.  *     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.1    0.2    0.1    0.1     0.     0.     0.     0.
0.     0.     0.     0.
130.  *     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
140.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
150.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
160.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
170.  *    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2
0.     0.     0.     0.
180.  *    0.4    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.5    0.4
0.3    0.2     0.     0.
190.  *    0.4    0.3     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.6    0.6    0.4
0.4    0.2    0.2     0.
200.  *    0.4    0.3     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.4    0.5    0.8    0.5
0.3    0.3    0.2    0.2
210.  *    0.4    0.4     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.3    0.5    0.6    0.6    0.4
0.3    0.3    0.3    0.2
220.  *    0.4    0.4     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.3    0.3    0.5    0.6    0.7    0.3
0.3    0.3    0.3    0.3
230.  *    0.4    0.4     0.     0.     0.     0.     0.1    0.2    0.2    0.3    0.2    0.4    0.5    0.6    0.7    0.3
0.3    0.3    0.3    0.3
240.  *    0.5    0.5     0.     0.     0.1    0.2    0.2    0.2    0.3    0.3    0.3    0.4    0.5    0.6    0.6    0.4
0.3    0.3    0.3    0.3
250.  *    0.6    0.6    0.1    0.1    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.3    0.4    0.6    0.6    0.4
0.3    0.3    0.3    0.3
260.  *    0.8    0.8    0.1    0.2    0.2    0.2    0.3    0.4    0.4    0.5    0.4    0.2    0.4    0.6    0.6    0.5
0.3    0.3    0.3    0.3
270.  *    0.7    0.7    0.4    0.4    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.8    0.6    0.6
0.3    0.3    0.3    0.3
280.  *    0.2    0.2     1.     1.     1.    0.9    0.9    0.9     1.     1.    1.1    0.9    0.8    0.9    0.8    0.7
0.3    0.3    0.3    0.3
290.  *    0.1     0.    0.9     1.    1.2    1.2    1.3    1.1    1.1     1.     1.    1.1    0.9    1.1    1.2    0.9
0.4    0.4    0.3    0.3
```

```
 300.  *    0.1    0.1    0.9    0.9    0.9    0.9     1.    1.1     1.     1.     1.     1.    0.7    1.1    1.3    1.1
 0.6    0.5    0.5    0.5
 310.  *    0.1    0.1    0.8    0.9    0.9     1.     1.    0.9     1.     1.    0.8    0.7    0.8    0.8    1.2    1.1
 0.6    0.6    0.7    0.7
 320.  *    0.1    0.1    0.7    0.8    0.9     1.     1.     1.     1.    0.9    0.8    0.6    0.5    0.7    1.2    1.2
 0.9    0.7    0.7    0.8
 330.  *    0.1    0.1    0.6    0.6    0.7    0.8    0.9    0.9    0.9    0.9     1.    0.6    0.5    0.5     1.    1.2
 0.9     1.     1.    0.9
 340.  *     0.     0.    0.4    0.5    0.7    0.8    0.9    0.9    0.9    0.9    0.8    0.8    0.6    0.6    0.6     1.
 0.8    0.7    0.7    0.7
 350.  *     0.     0.    0.4    0.5    0.5    0.6    0.8    0.8    0.9    0.9    0.9    0.8    0.5    0.4    0.6    0.7
 0.7    0.6    0.6    0.6
 360.  *     0.     0.    0.3    0.5    0.5    0.6    0.7    0.8    0.8    0.8    0.8    0.7    0.6    0.5    0.5    0.4
 0.5    0.5    0.5    0.6

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.8    0.8     1.     1.    1.2    1.2    1.3    1.1    1.1     1.    1.1    1.1    0.9    1.1    1.3    1.2
 0.9     1.     1.    0.9
 DEGR. *    260    260    280    280    290    290    290    290    290     50    280    290    290    290    300    320
 320    330    330    330
```

FF PAGE 8

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

```
 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
 REC77  REC78  REC79  REC80

 ------*-----------------------------------------------------------------------------------------------------------------
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```

```
   .  *    0.6    0.4    0.7    0.7    0.6    0.6    0.5    0.5    0.7    0.6    0.9     1.    1.3    1.1    0.9    0.8
   0.5    0.9    0.9    0.5
  10.  *    0.2    0.2    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.9    1.1    1.4    1.2    0.9    0.9
  0.4     1.    0.9    0.5
  20.  *    0.2    0.2    0.7    0.6    0.7    0.8    0.7    0.5    0.5    0.4    0.7    1.2    1.3     1.    0.9    0.9
  0.3    0.9    0.9    0.8
  30.  *    0.2    0.2    0.6    0.6    0.6    0.7    0.9    0.8    0.6    0.4    0.6    0.9    1.3    1.2    0.9    0.9
  0.4    0.9    0.9    0.9
  40.  *    0.1    0.1    0.5    0.6    0.7    0.8    0.9     1.    0.7    0.6    0.6    0.6    1.3    1.2     1.    0.9
  0.4    1.1    1.1     1.
  50.  *    0.1    0.1    0.5    0.5    0.5    0.7    0.9     1.    0.9    0.6    0.7    0.7     1.    1.3     1.     1.
  0.4    1.1    1.1    1.1
  60.  *     0.     0.    0.4    0.5    0.5    0.5    0.9     1.    1.1    0.7    0.9    0.7    1.1    1.4    1.1    0.8
  0.3    1.2    1.1    1.1
  70.  *     0.     0.    0.4    0.4    0.4    0.5    0.5    0.9     1.    0.9    0.9    1.1    1.2    1.3    1.2     1.
  0.1    1.1    1.1    1.1
  80.  *     0.     0.    0.2    0.4    0.4    0.4    0.5    0.6    0.8    0.8    0.7    1.1    1.2    1.3    1.1     1.
  0.1    1.2     1.     1.
  90.  *     0.     0.    0.2    0.4    0.4    0.4    0.4    0.5    0.7    0.6    0.6    0.9    0.8    0.9    0.8    0.5
  0.     1.     1.    1.1
 100.  *     0.     0.     0.    0.4    0.4    0.4    0.4    0.4    0.6    0.5    0.3    0.4    0.3    0.3    0.3    0.3
 0.    0.5    0.4    0.4
 110.  *     0.     0.     0.    0.3    0.4    0.4    0.4    0.4    0.5    0.5    0.2    0.3    0.4    0.3    0.1    0.1
 0.    0.1    0.1    0.1
 120.  *     0.     0.     0.    0.3    0.4    0.4    0.4    0.4    0.5    0.5    0.4    0.2    0.2    0.1    0.1    0.1
 0.     0.     0.     0.
 130.  *     0.     0.     0.    0.2    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.3    0.1    0.1    0.1     0.
 0.     0.     0.     0.
 140.  *     0.     0.     0.    0.1    0.3    0.4    0.4    0.4    0.4    0.4    0.5    0.2    0.1    0.1     0.     0.
 0.     0.     0.     0.
 150.  *     0.     0.     0.     0.    0.2    0.3    0.4    0.4    0.4    0.4    0.3    0.1    0.1     0.     0.     0.
 0.     0.     0.     0.
 160.  *     0.     0.     0.     0.    0.1    0.2    0.3    0.3    0.3    0.3    0.2     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 170.  *     0.     0.     0.     0.    0.1    0.1    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.
 0.2     0.     0.     0.
 180.  *     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.
 0.3     0.     0.     0.
 190.  *     0.     0.     0.     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.
 0.4     0.     0.     0.
```

```
200.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.5     0.     0.     0.
210.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.4     0.     0.     0.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.3     0.     0.     0.
230.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.3     0.     0.     0.
240.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.3     0.     0.     0.
250.  *    0.3     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.     0.     0.
0.3     0.     0.     0.
260.  *    0.3     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.
0.3     0.     0.     0.
270.  *    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.4    0.4    0.2    0.1
0.3    0.1    0.1     0.
280.  *    0.3    0.2     0.     0.     0.     0.     0.     0.     0.2    0.3    0.5    0.8    0.9    0.8    0.4    0.3
0.3    0.2    0.2    0.1
290.  *    0.3    0.3     0.     0.     0.     0.     0.1    0.2    0.3    0.6    0.9    1.2    1.2    1.1    0.8    0.5
0.5    0.5    0.3    0.2
300.  *    0.5    0.3     0.     0.     0.1    0.2    0.2    0.4    0.5    0.7    1.1    1.3    1.3    1.3    0.9    0.8
0.7    0.6    0.3    0.2
310.  *    0.7    0.6    0.1    0.2    0.2    0.3    0.4    0.5    0.5    0.9     1.    1.3    1.4    1.2     1.    0.8
0.7    0.6    0.4    0.3
320.  *    0.9    0.8    0.3    0.3    0.3    0.3    0.3    0.5    0.5    0.7    0.9    1.3    1.2    1.1     1.    0.9
0.9    0.8    0.5    0.3
330.  *    0.8    0.9    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.6    0.9    1.2    1.1     1.    0.9    0.8
1.    0.8    0.5    0.3
340.  *    0.7    0.6    0.4    0.5    0.5    0.5    0.6    0.6    0.6    0.5    0.8    1.2    1.2     1.    0.8    0.8
1.    0.8    0.6    0.3
350.  *    0.6    0.6    0.5    0.4    0.4    0.3    0.3    0.3    0.7     1.    0.9    1.1    1.3    0.9    0.8    0.8
0.9    0.8    0.7    0.3
360.  *    0.6    0.4    0.7    0.7    0.6    0.6    0.5    0.5    0.7    0.6    0.9     1.    1.3    1.1    0.9    0.8
0.5    0.9    0.9    0.5

------*-----------------------------------------------------------------------------------------------------------------
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MAX   *    0.9    0.9    0.7    0.7    0.7    0.8    0.9     1.    1.1     1.    1.1    1.3    1.4    1.4    1.2     1.
1.    1.2    1.1    1.1
DEGR. *    320    330      0      0     20     20     30     40     60    350    300    300     10     60     70     50
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330 60 40 50

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88
.	* 0.4	0.3	0.1	0.	0.	0.	0.	0.
10.	* 0.4	0.3	0.2	0.	0.	0.	0.	0.
20.	* 0.5	0.4	0.4	0.	0.1	0.1	0.1	0.1
30.	* 0.7	0.5	0.4	0.1	0.1	0.1	0.1	0.1
40.	* 0.8	0.6	0.5	0.1	0.1	0.1	0.1	0.1
50.	* 0.9	0.8	0.7	0.1	0.1	0.1	0.1	0.1
60.	* 1.1	1.	0.8	0.1	0.1	0.1	0.1	0.1
70.	* 1.1	1.	0.9	0.1	0.1	0.1	0.1	0.2
80.	* 1.1	1.1	1.	0.1	0.2	0.2	0.2	0.2
90.	* 1.	0.9	0.9	0.2	0.2	0.2	0.3	0.3
100.	* 0.5	0.3	0.3	0.6	0.6	0.7	0.8	0.9
110.	* 0.1	0.1	0.1	0.7	0.7	0.9	1.1	1.1
120.	* 0.	0.	0.	0.7	0.7	0.8	0.9	1.
130.	* 0.	0.	0.	0.6	0.7	0.8	1.	1.
140.	* 0.	0.	0.	0.4	0.6	0.7	0.8	0.9
150.	* 0.	0.	0.	0.3	0.3	0.6	0.8	0.8
160.	* 0.	0.	0.	0.2	0.2	0.4	0.6	0.7
170.	* 0.	0.	0.	0.2	0.2	0.3	0.4	0.7
180.	* 0.	0.	0.	0.1	0.2	0.2	0.4	0.6
190.	* 0.	0.	0.	0.1	0.1	0.2	0.2	0.5
200.	* 0.	0.	0.	0.	0.1	0.2	0.2	0.3
210.	* 0.	0.	0.	0.	0.	0.1	0.2	0.3
220.	* 0.	0.	0.	0.	0.	0.1	0.1	0.3

230.	*	0.	0.	0.	0.	0.	0.	0.1	0.2
240.	*	0.	0.	0.	0.	0.	0.	0.	0.1
250.	*	0.	0.	0.	0.	0.	0.	0.	0.
260.	*	0.	0.	0.	0.	0.	0.	0.	0.
270.	*	0.	0.	0.	0.	0.	0.	0.	0.
280.	*	0.1	0.	0.	0.	0.	0.	0.	0.
290.	*	0.1	0.	0.	0.	0.	0.	0.	0.
300.	*	0.2	0.	0.	0.	0.	0.	0.	0.
310.	*	0.2	0.1	0.	0.	0.	0.	0.	0.
320.	*	0.3	0.1	0.	0.	0.	0.	0.	0.
330.	*	0.3	0.1	0.	0.	0.	0.	0.	0.
340.	*	0.3	0.2	0.	0.	0.	0.	0.	0.
350.	*	0.3	0.2	0.1	0.	0.	0.	0.	0.
360.	*	0.4	0.3	0.1	0.	0.	0.	0.	0.
MAX	*	1.1	1.1	1.	0.7	0.7	0.9	1.1	1.1
DEGR.	*	60	80	80	110	110	110	110	110

THE HIGHEST CONCENTRATION OF 1.40 ppm OCCURRED AT RECEPTOR REC73.

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**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/6/2012 4:57:15 PM
** File: F:\2975 FirstLight\Microscale\Worst\49 Rte 44 & Orchard LOS&ADT\2012EXPM.ou2
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: FirstLight-Taunton-Rte 44 & Orchard St- Existing PM RUN: CAL3QHC RUN

DATE : 12/ 6/12
TIME : 16:57:14

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE
VPH EF H W V/C QUEUE	*	X1	Y1	X2	Y2	*	(M)		
	*	(DEG)	(G/MI)	(M)	(M)	(VEH)			
1. EBTL	*	238118.14	850750.62	238199.34	850742.50	*	82.	96.	AG
1198. 8.7 0.0 13.4									
2. EBTLQ	*	238199.34	850742.50	238141.73	850748.25	*	58.	276.	AG
130. 100.0 0.0 7.4 0.70 9.7									
3. EBRL	*	238167.22	850742.50	238197.22	850740.06	*	30.	95.	AG

363. 8.7 0.0 9.0								
4. EBRLQ	*	238197.22	850740.06	238162.25	850742.88	*	35.	275. AG
65. 100.0 0.0 3.0 0.43 5.8								
5. WBLT	*	238300.23	850741.88	238230.86	850748.50	*	70.	275. AG
1525. 8.7 0.0 13.4								
6. WBLTQ	*	238230.86	850748.50	238655.62	850707.94	*	427.	95. AG
157. 100.0 0.0 7.4 1.15 71.1								
7. WBRL	*	238299.03	850746.69	238231.45	850754.00	*	68.	276. AG
157. 8.7 0.0 9.4								
8. WBRLQ	*	238231.45	850754.00	238246.02	850752.44	*	15.	96. AG
63. 100.0 0.0 3.4 0.18 2.4								
9. NBLL	*	238225.09	850675.19	238217.52	850730.06	*	55.	352. AG
273. 8.7 0.0 9.7								
10. NBLLQ	*	238217.52	850730.06	238222.38	850694.88	*	35.	172. AG
88. 100.0 0.0 3.7 0.51 5.9								
11. NBTR	*	238229.05	850675.50	238221.16	850730.06	*	55.	352. AG
147. 8.7 0.0 10.0								
12. NBTRQ	*	238221.16	850730.06	238224.38	850707.75	*	23.	172. AG
103. 100.0 0.0 4.0 0.47 3.8								
13. SBLL	*	238200.86	850837.00	238209.34	850762.75	*	75.	173. AG
164. 8.7 0.0 9.7								
14. SBLLQ	*	238209.34	850762.75	238206.55	850787.19	*	25.	353. AG
101. 100.0 0.0 3.7 0.47 4.1								
15. SBTR	*	238200.25	850836.69	238204.80	850763.69	*	73.	176. AG
257. 8.7 0.0 9.7								
16. SBTRQ	*	238204.80	850763.69	238193.88	850939.00	*	176.	356. AG
110. 100.0 0.0 3.7 1.16 29.3								
17. EBOUT	*	238232.06	850738.25	238299.34	850731.56	*	68.	96. AG
1317. 8.7 0.0 13.4								
18. WBOUT	*	238198.44	850754.25	238133.30	850759.44	*	65.	275. AG
1886. 8.7 0.0 13.4								
19. NBOUT	*	238213.58	850762.50	238204.19	850836.12	*	74.	353. AG
349. 8.7 0.0 9.4								
20. SBOUT	*	238209.64	850730.62	238221.16	850675.50	*	56.	168. AG
532. 8.7 0.0 9.0								
21. EBL	*	238199.95	850742.50	238213.77	850761.88	*	24.	35. AG
84. 9.7 0.0 9.0								
22. EBT	*	238199.77	850742.12	238231.58	850738.50	*	32.	97. AG
1114. 8.7 0.0 12.0								
23. EBR	*	238197.95	850740.06	238209.58	850731.88	*	14.	125. AG

363. 10.8 0.0 9.0
24. WBL * 238229.97 850749.00 238209.77 850732.31 * 26. 230. AG
23. 9.7 0.0 9.0
25. WBT * 238230.06 850748.75 238197.77 850754.25 * 33. 280. AG
1502. 8.7 0.0 12.0
26. WBR * 238230.81 850753.88 238213.69 850760.75 * 18. 292. AG
157. 10.8 0.0 9.0
27. NBL * 238217.69 850731.38 238199.09 850754.06 * 29. 321. AG
273. 9.7 0.0 9.0
28. NBT * 238221.11 850730.94 238214.62 850761.75 * 31. 348. AG
108. 8.7 0.0 9.0
29. NBR * 238221.39 850730.06 238232.73 850737.88 * 14. 55. AG
39. 10.8 0.0 9.0
30. SBL * 238209.11 850762.25 238229.58 850738.81 * 31. 139. AG
164. 9.7 0.0 9.0
31. SBT * 238205.02 850763.12 238209.02 850733.38 * 30. 172. AG
146. 8.7 0.0 9.0
32. SBR * 238204.53 850762.81 238192.25 850754.06 * 15. 235. AG
111. 10.8 0.0 9.0

FF

JOB: FirstLight-Taunton-Rte 44 & Orchard St- Existing PM RUN: CAL3QHC
RUN

DATE : 12/ 6/12
TIME : 16:57:14

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. EBTLQ	*	120	58	6.0	1198	1900	50.22	3	3
4. EBRLQ	*	120	58	6.0	363	1900	50.22	3	3
6. WBLTQ	*	120	70	6.0	1525	1900	50.22	3	3
8. WBRLQ	*	120	56	6.0	157	1900	50.22	3	3
10. NBLLQ	*	120	78	6.0	273	1900	50.22	3	3

12. NBTRQ	*	120	92	6.0	147	1900	50.22	3	3
14. SBLLQ	*	120	90	6.0	164	1900	50.22	3	3
16. SBTRQ	*	120	98	6.0	257	1900	50.22	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. R_001	*	238196.62	850836.38	1.8	*
2. R_002	*	238196.92	850831.56	1.8	*
3. R_003	*	238196.62	850826.12	1.8	*
4. R_004	*	238196.92	850820.31	1.8	*
5. R_005	*	238196.92	850814.25	1.8	*
6. R_006	*	238197.52	850809.12	1.8	*
7. R_007	*	238199.05	850801.56	1.8	*
8. R_008	*	238198.44	850795.50	1.8	*
9. R_009	*	238199.95	850788.25	1.8	*
10. R_010	*	238201.45	850782.44	1.8	*
11. R_011	*	238201.77	850776.12	1.8	*
12. R_012	*	238200.25	850770.62	1.8	*
13. R_013	*	238196.92	850764.88	1.8	*
14. R_014	*	238191.77	850762.19	1.8	*
15. R_015	*	238184.80	850761.56	1.8	*
16. R_016	*	238176.62	850761.56	1.8	*
17. R_017	*	238169.66	850762.19	1.8	*
18. R_018	*	238161.77	850763.38	1.8	*
19. R_019	*	238155.41	850764.88	1.8	*
20. R_020	*	238208.12	850837.00	1.8	*
21. R_021	*	238207.22	850832.19	1.8	*
22. R_022	*	238208.44	850824.88	1.8	*
23. R_023	*	238209.34	850820.94	1.8	*
24. R_024	*	238209.95	850814.88	1.8	*
25. R_025	*	238210.55	850807.31	1.8	*
26. R_026	*	238210.86	850800.62	1.8	*
27. R_027	*	238211.77	850794.56	1.8	*

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RECEPTOR	COORDINATES (M) X	Y	Z
28. R_028	238212.98	850785.50	1.8
29. R_029	238214.48	850776.69	1.8
30. R_030	238216.61	850768.81	1.8
31. R_031	238220.86	850762.75	1.8
32. R_032	238225.41	850759.12	1.8
33. R_033	238232.38	850757.62	1.8
34. R_034	238239.95	850756.69	1.8
35. R_035	238249.64	850756.44	1.8
36. R_036	238257.22	850755.19	1.8
37. R_037	238266.31	850754.56	1.8
38. R_038	238274.19	850754.25	1.8
39. R_039	238282.38	850754.00	1.8
40. R_040	238289.34	850753.38	1.8
41. R_041	238295.41	850753.38	1.8
42. R_042	238299.64	850752.75	1.8
43. R_043	238299.34	850724.56	1.8
44. R_044	238292.06	850725.50	1.8
45. R_045	238284.19	850726.44	1.8
46. R_046	238275.70	850727.31	1.8
47. R_047	238267.81	850728.25	1.8
48. R_048	238261.16	850729.44	1.8
49. R_049	238254.48	850730.62	1.8
50. R_050	238247.81	850731.56	1.8
51. R_051	238240.55	850731.88	1.8
52. R_052	238234.48	850730.94	1.8
53. R_053	238229.95	850728.25	1.8
54. R_054	238227.52	850725.19	1.8
55. R_055	238226.31	850719.12	1.8
56. R_056	238226.92	850712.19	1.8
57. R_057	238228.44	850700.38	1.8
58. R_058	238229.05	850695.50	1.8
59. R_059	238229.95	850690.06	1.8
60. R_060	238230.55	850685.19	1.8
61. R_061	238231.16	850680.06	1.8
62. R_062	238232.06	850675.50	1.8
63. R_063	238217.52	850675.50	1.8
64. R_064	238216.61	850680.62	1.8

65. R_065	*	238215.09	850687.00	1.8 *
66. R_066	*	238213.89	850695.19	1.8 *
67. R_067	*	238212.98	850704.31	1.8 *
68. R_068	*	238211.45	850710.94	1.8 *
69. R_069	*	238208.73	850719.75	1.8 *
70. R_070	*	238205.70	850726.12	1.8 *
71. R_071	*	238202.06	850731.56	1.8 *
72. R_072	*	238194.80	850734.88	1.8 *
73. R_073	*	238186.92	850736.44	1.8 *
74. R_074	*	238179.95	850737.00	1.8 *
75. R_075	*	238171.77	850736.12	1.8 *
76. R_076	*	238164.50	850735.19	1.8 *
77. R_077	*	238227.22	850707.00	1.8 *
78. R_078	*	238146.92	850739.44	1.8 *
79. R_079	*	238138.44	850740.06	1.8 *

FF

JOB: FirstLight-Taunton-Rte 44 & Orchard St- Existing PM RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
80. R_080	*	238132.08	850740.38	1.8 *
81. R_081	*	238126.62	850741.56	1.8 *
82. R_082	*	238121.17	850741.88	1.8 *
83. R_083	*	238117.23	850741.88	1.8 *
84. R_084	*	238117.53	850767.94	1.8 *
85. R_085	*	238122.08	850768.25	1.8 *
86. R_086	*	238127.83	850767.00	1.8 *
87. R_087	*	238131.77	850766.38	1.8 *
88. R_088	*	238135.11	850766.12	1.8 *

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	*	0.4	0.4	0.5	0.5	0.5	0.5	0.7	0.5	0.7	1.1	1.1	0.5	0.4	0.2	0.1	0.1	0.	0.	0.1
10.	*	0.5	0.5	0.6	0.6	0.5	0.7	0.9	0.8	0.9	1.1	1.2	0.9	0.5	0.2	0.2	0.1	0.1	0.	0.
20.	*	0.5	0.5	0.5	0.5	0.7	0.7	0.8	0.7	0.8	1.	1.1	0.9	0.6	0.3	0.2	0.1	0.1	0.1	0.
30.	*	0.4	0.5	0.5	0.7	0.7	0.7	0.8	0.7	0.8	1.	1.1	0.9	0.6	0.5	0.2	0.1	0.1	0.1	0.
40.	*	0.4	0.5	0.6	0.7	0.6	0.7	0.7	0.6	0.7	0.9	1.	0.8	0.7	0.5	0.3	0.2	0.2	0.2	0.
50.	*	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.9	0.8	0.7	0.6	0.3	0.3	0.2	0.2	0.1	0.
60.	*	0.3	0.4	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.8	0.8	0.7	0.6	0.3	0.3	0.3	0.2	0.2	0.
70.	*	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.8	0.7	0.6	0.2	0.3	0.3	0.4	0.2	0.
80.	*	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.8	0.7	0.5	0.3	0.6	0.7	0.6	0.5	0.3
90.	*	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.9	0.9	0.8	0.6	0.7	0.7	0.8	0.9	0.9	0.8
100.	*	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.8	1.1	1.1	1.1	0.9	1.	1.3	1.3	1.5	1.2	1.1
110.	*	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.8	1.1	1.2	1.4	1.4	0.9	1.3	1.2	1.3	1.6	1.5	1.4
120.	*	0.7	0.8	0.7	0.7	0.6	0.8	1.	0.9	1.2	1.5	1.3	1.2	0.8	1.	1.2	1.3	1.2	1.4	1.3
130.	*	0.8	0.9	0.9	0.9	0.9	1.	1.1	1.2	1.4	1.6	1.6	1.1	0.8	1.	1.2	1.1	1.2	1.2	1.2
140.	*	1.	1.	1.	1.	1.	1.	1.1	1.3	1.4	1.5	1.5	1.	0.6	0.9	1.1	1.1	1.1	1.1	1.1
150.	*	1.1	1.1	1.	1.	1.	1.2	1.3	1.4	1.2	1.5	1.1	0.7	0.8	1.2	1.1	1.1	1.1	1.1	1.1

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 1.1    1.1    1.1    0.3
 160.  *    0.8    0.9    0.8    0.9    0.9     1.    1.1    0.9    0.9    1.2     1.    0.7    0.8     1.     1.    1.1
 1.     1.    0.9    0.4
 170.  *    0.8    0.8    0.9    0.9    0.6    0.7    0.8    0.7    0.7     1.    0.8    0.5    0.8    0.9     1.    1.1
 1.     1.    0.9    0.4
 180.  *    0.6    0.6    0.4    0.4    0.5    0.6    0.7    0.6    0.8    0.8     1.    0.6    0.7     1.     1.    1.1
 1.    0.9    0.9    0.6
 190.  *    0.5    0.5    0.5    0.5    0.4    0.4    0.5    0.3    0.7    0.7    0.7    0.5    0.9     1.    1.1     1.
 1.    0.9    0.9    0.8
 200.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.6    0.6    0.6    0.9     1.     1.     1.
 0.9    0.9    0.9     1.
 210.  *    0.2    0.2    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.5    0.8    0.9     1.     1.     1.
 0.9    0.9    0.9    0.9
 220.  *    0.1    0.1    0.2    0.2    0.2    0.3    0.4    0.4    0.4    0.4    0.5    0.9     1.    1.1    1.1     1.
 1.     1.    0.9    0.7

 ------*-------------------------------------------------------------------------------------------------------------------
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 MAX   *    1.1    1.1     1.     1.     1.    1.2    1.3    1.4    1.4    1.6    1.6    1.4     1.    1.3    1.3    1.3
 1.6    1.5    1.4     1.
 DEGR. *    150    150    140    140    140    150    150    150    130    130    130    110    220    110    100    100
 110    110    110    200
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      MODEL RESULTS
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      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC1   REC2   REC3   REC4   REC5   REC6   REC7   REC8   REC9   REC10  REC11  REC12  REC13  REC14  REC15  REC16
 REC17  REC18  REC19  REC20

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230.  *     0.     0.     0.    0.1    0.1    0.2    0.2    0.4    0.4    0.5    0.5    0.8     1.    1.1     1.     1.
1.    0.9    0.9    0.4
240.  *     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.4    0.5    0.7     1.    1.1    1.1    1.1
1.1     1.    0.8    0.4
250.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.5    0.6    0.9    1.1    1.2    1.1
1.1    0.9    0.7    0.4
260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.4    0.7    1.1    1.1    1.1
0.9    0.8    0.6    0.2
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.4    0.7    0.8    0.9
0.8    0.6    0.4    0.2
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.4    0.5    0.6
0.5    0.4    0.2    0.2
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3
0.3    0.2    0.1    0.2
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.2
0.2    0.1    0.1    0.2
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1
0.1    0.1     0.    0.3
320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1
0.1    0.1     0.    0.3
330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.     0.     0.     0.1    0.1
0.1    0.1     0.    0.3
340.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.1    0.2    0.3    0.3    0.1    0.     0.     0.     0.
0.     0.     0.    0.3
350.  *    0.3    0.3    0.2    0.3    0.3    0.3    0.4    0.3    0.4    0.6    0.6    0.4    0.1    0.1     0.     0.
0.     0.     0.    0.3
360.  *    0.4    0.4    0.5    0.5    0.5    0.5    0.7    0.5    0.7    1.1    1.1    0.5    0.4    0.2    0.1    0.1
0.     0.     0.    0.1

------*-------------------------------------------------------------------------------------------------------------------
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MAX   *    1.1    1.1     1.     1.     1.    1.2    1.3    1.4    1.4    1.6    1.6    1.4     1.    1.3    1.3    1.3
1.6    1.5    1.4     1.
DEGR. *    150    150    140    140    140    150    150    150    130    130    130    110    220    110    100    100
110    110    110    200

      MODEL RESULTS
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REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
.	* 0.2	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.
10.	* 0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20.	* 0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
40.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MAX	* 0.2	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.
DEGR.	* 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
50.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
60.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
70.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
80.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
90.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.3	0.5	0.6	0.6	0.4	0.5	0.4	0.4	0.3	0.3
100.	*	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.7	1.1	1.2	1.1	0.9	0.9	0.8	0.6	0.6	0.5
110.	*	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.7	1.	1.4	1.5	1.4	1.2	1.2	1.1	1.	0.7	0.6
120.	*	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.6	0.7	1.	1.2	1.5	1.4	1.3	1.3	1.1	1.1	0.9	0.6
130.	*	0.1	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.7	1.1	1.3	1.5	1.5	1.3	1.3	1.3	1.1	0.9	0.6
140.	*	0.2	0.3	0.3	0.3	0.3	0.4	0.3	0.5	0.6	0.6	0.9	1.1	1.3	1.4	1.1	1.1	1.1	1.1	1.	0.7
150.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.7	0.9	1.2	1.3	1.1	1.1	1.1	1.1	1.	0.8
160.	*	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.5	0.4	0.8	0.7	1.2	1.2	1.	1.	1.	1.	1.	0.8
170.	*	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.5	0.6	0.7	0.8	1.	1.2	1.	1.	1.	1.	0.9	0.9
180.	*	0.8	0.8	0.7	0.6	0.7	0.7	0.7	0.6	0.4	0.7	0.9	0.8	1.	1.2	1.	1.	1.	1.	1.	1.
190.	*	0.8	0.8	0.9	0.9	0.9	1.	0.9	0.7	0.5	0.5	0.8	1.	1.	1.2	1.	1.	1.	1.	1.	1.

```
200.  *     1.     1.     1.     1.     1.1     1.     1.2     1.     0.7     0.5     0.6     0.9     1.     1.4     1.     1.
1.     1.    0.9    0.9
210.  *    0.9    0.9    0.9    0.9    0.9    1.1    1.1    1.2    0.8    0.6    0.5    0.7    0.8    1.3    1.2     1.
1.     1.     1.     1.
220.  *    0.8    0.8    0.9    0.9    0.9    0.9     1.    1.2    0.9    0.7    0.7    0.7    0.5     1.    1.4    1.3
1.1     1.     1.     1.
230.  *    0.6    0.5    0.5    0.6    0.6    0.8    0.9     1.    0.9    0.9    0.8    0.8    0.7     1.    1.2    1.2
1.1    1.1    1.1    1.1
240.  *    0.5    0.4    0.4    0.5    0.5    0.6    0.7     1.    1.1    1.2    1.1    0.9    0.8    1.2    1.1    1.2
1.3    1.2    1.1    1.2
250.  *    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.9    1.1     1.    0.9    1.1    0.9    1.1    1.4    1.5
1.2    1.3    1.3    1.2
260.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.7    0.9    0.9    0.8    1.1    1.1    1.1    1.1    1.3
1.3    1.4    1.4    1.5
270.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.6    0.7    0.7    0.8    0.8    0.9    0.8    0.8    1.1
1.    0.9     1.     1.
280.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.6    0.7    0.5    0.6    0.4    0.4    0.2    0.4
0.4    0.4    0.4    0.4
290.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.6    0.6    0.4    0.4    0.4    0.3    0.3    0.1
0.1    0.1    0.1     0.
300.  *    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.4    0.6    0.6    0.5    0.4    0.2    0.2    0.2    0.1
0.1    0.1    0.1    0.1
310.  *    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.7    0.6    0.5    0.3    0.3    0.2    0.1    0.1
0.1    0.1    0.1    0.1
320.  *    0.4    0.5    0.5    0.6    0.6    0.6    0.6    0.5    0.8    0.8    0.5    0.4    0.3    0.1    0.1    0.1
0.1    0.1    0.1    0.1
330.  *    0.4    0.4    0.5    0.7    0.7    0.7    0.7    0.7    0.8    0.8    0.4    0.4    0.2    0.1    0.1    0.1
0.1    0.1    0.1     0.
340.  *    0.5    0.4    0.4    0.5    0.7    0.7    0.7    0.7    0.7    0.7    0.4    0.3    0.1    0.1    0.1    0.1
0.     0.     0.     0.
350.  *    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.4    0.4    0.4    0.3    0.1    0.1    0.1     0.     0.
0.     0.     0.     0.
360.  *    0.2    0.3    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.2    0.1    0.1     0.     0.     0.     0.
0.     0.     0.     0.

------*-------------------------------------------------------------------------------------------------------------------
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MAX   *     1.     1.     1.     1.     1.1    1.1    1.2    1.2    1.1    1.2    1.1    1.4    1.5    1.5    1.4    1.5
1.3    1.4    1.4    1.5
DEGR. *    200    200    200    200    200    210    200    210    240    240    130    110    110    130    220    250
```

130 260 260 260

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	* 0.	0.	0.7	1.	1.	1.	1.	1.	1.	1.	1.1	0.7	0.6	0.6	0.3	0.6	0.7	0.7	0.7	0.6
10.	* 0.	0.	0.5	0.9	1.	1.	1.	1.	1.	1.	1.	1.	0.7	0.5	0.5	0.5	0.3	0.3	0.3	0.3
20.	* 0.	0.	0.4	0.9	1.	1.	1.	1.	1.	1.	1.	1.	0.7	0.6	0.5	0.3	0.3	0.3	0.3	0.3
30.	* 0.	0.	0.3	0.7	0.9	1.	1.	1.	1.	1.	1.	1.	0.7	0.6	0.6	0.6	0.3	0.3	0.3	0.3
40.	* 0.	0.	0.3	0.7	0.9	1.	1.	1.	1.	1.	1.	1.	0.8	0.6	0.6	0.6	0.3	0.3	0.3	0.3
50.	* 0.	0.	0.3	0.6	0.8	0.9	1.	1.	1.	1.	1.	1.	0.9	0.7	0.6	0.6	0.4	0.3	0.3	0.3
60.	* 0.	0.	0.3	0.5	0.8	1.	1.	1.1	1.1	1.1	1.1	1.1	1.	0.8	0.6	0.5	0.4	0.4	0.2	0.1
70.	* 0.	0.	0.3	0.6	0.7	1.	1.1	1.1	1.3	1.3	1.3	1.2	0.9	0.8	0.5	0.5	0.3	0.2	0.2	0.1
80.	* 0.1	0.1	0.4	0.6	0.7	0.8	1.	1.	1.2	1.2	1.2	1.2	0.9	0.7	0.6	0.3	0.2	0.2	0.1	0.1
90.	* 0.2	0.2	0.3	0.4	0.6	0.6	0.7	0.9	1.1	1.1	1.1	0.9	0.7	0.5	0.3	0.2	0.1	0.1	0.1	0.1

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100.  *    0.4    0.5    0.2    0.3    0.4    0.4    0.5    0.6    0.6    0.7    0.7    0.5    0.2    0.2    0.1    0.1
0.     0.     0.     0.
110.  *    0.5    0.5     0.     0.     0.1    0.1    0.1    0.2    0.2    0.3    0.3    0.1     0.     0.     0.     0.
0.     0.     0.     0.
120.  *    0.5    0.5     0.     0.     0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.
0.     0.     0.     0.
130.  *    0.5    0.4     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.1    0.     0.     0.     0.     0.
0.     0.     0.     0.
140.  *    0.5    0.4     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.     0.     0.     0.     0.
0.     0.     0.     0.
150.  *    0.5    0.4     0.     0.     0.     0.     0.     0.     0.     0.1    0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
160.  *    0.7    0.5     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
170.  *    0.8    0.5     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.1
0.1    0.1     0.     0.
180.  *    0.8    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3    0.5    0.3
0.2    0.1    0.1     0.
190.  *    0.8    0.8     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.4    0.6    0.7    0.5
0.3    0.2    0.1     0.
200.  *    0.9    0.9     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3    0.5    0.8    0.8    0.7
0.3    0.3    0.2     0.
210.  *     1.    0.9     0.     0.     0.     0.     0.     0.     0.     0.     0.3    0.3    0.5    0.8    0.9    0.7
0.3    0.3    0.3    0.1
220.  *     1.     1.     0.     0.     0.     0.     0.     0.     0.     0.2    0.3    0.4    0.6    0.7    0.8    0.7
0.3    0.2    0.2    0.2
230.  *     1.     1.     0.     0.     0.     0.     0.     0.1    0.2    0.4    0.3    0.4    0.5    0.7    0.7    0.7
0.3    0.2    0.2    0.2
240.  *    1.1    1.1     0.     0.     0.     0.     0.1    0.2    0.3    0.3    0.3    0.4    0.5    0.7    0.7    0.7
0.4    0.2    0.2    0.2
250.  *    1.2    1.2    0.1    0.1    0.1    0.1    0.2    0.3    0.3    0.3    0.4    0.3    0.5    0.7    0.7    0.7
0.4    0.2    0.2    0.2
260.  *    1.5    1.3    0.1    0.1    0.1    0.1    0.2    0.4    0.4    0.5    0.4    0.2    0.4    0.7    0.7    0.7
0.4    0.3    0.2    0.2
270.  *     1.    1.1    0.3    0.4    0.4    0.6    0.6    0.7    0.7    0.7    0.6    0.4    0.6    0.8    0.7    0.7
0.4    0.3    0.2    0.2
280.  *    0.3    0.3    1.1    1.2    1.2    1.1    0.9    0.9    0.9     1.    0.8    0.7    0.8    0.9    0.9    0.8
0.4    0.4    0.2    0.2
290.  *     0.     0.    1.2    1.2    1.4    1.2    1.2    1.2    1.2    1.1    1.1    1.1     1.    1.1    1.1    1.1
0.5    0.4    0.2    0.2
```

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300.  *    0.1    0.1    1.1    1.1    1.2    1.1    1.1    1.2    1.1     1.     1.     1.    0.9    0.9    1.5    1.1
0.7    0.7    0.6    0.3
310.  *    0.1    0.1    1.2    1.2    1.2    1.2    1.3    1.1    1.1    1.2    0.9    0.7    0.9    0.9    1.2    1.4
0.9    0.8    0.7    0.7
320.  *    0.1    0.1    1.1    1.1    1.1    1.1    1.1    1.1    1.2     1.    1.1    0.7    0.7    0.7    1.3    1.4
0.9    0.9    0.8    0.7
330.  *     0.     0.    0.9    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    0.7    0.7    0.5     1.    1.2
1.1     1.     1.    0.9
340.  *     0.     0.    0.9     1.     1.     1.    1.1    1.1    1.1    1.2     1.    0.9    0.6    0.6    0.7     1.
1.    0.9    0.9    0.9
350.  *     0.     0.    0.7     1.     1.     1.     1.     1.     1.     1.    1.2    0.7    0.5    0.5    0.6    0.6
0.7    0.8    0.7    0.7
360.  *     0.     0.    0.7     1.     1.     1.     1.     1.     1.     1.    1.1    0.7    0.6    0.6    0.3    0.6
0.7    0.7    0.7    0.6

------*-----------------------------------------------------------------------------------------------------------------
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MAX   *    1.5    1.3    1.2    1.2    1.4    1.2    1.3    1.2    1.3    1.3    1.3    1.2     1.    1.1    1.5    1.4
1.1     1.     1.    0.9
DEGR. *    260    260    290    280    290    290    310    290     70     70     70     70     60    290    300    310
330    330    330    330
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
*	REC61	REC62	REC63	REC64	REC65	REC66	REC67	REC68	REC69	REC70	REC71	REC72	REC73	REC74	REC75	REC76
REC77	REC78	REC79	REC80													

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   .  *    0.4    0.3    0.9    0.9    0.9    0.7    0.7    0.5     1.    0.9    1.1    1.3    1.4    1.4    1.1     1.
   0.8    0.9    0.6    0.4
  10.  *    0.3    0.3    0.7    0.9    0.9    0.9    0.8    0.6    0.8    0.9    0.8    1.4    1.5    1.4    1.2    1.1
  0.5    0.9    0.7    0.5
  20.  *    0.3    0.3    0.7    0.8    0.9    0.9     1.    0.7    0.6    0.7    0.7    1.3    1.6    1.3    1.2    1.1
  0.3     1.    0.9    0.6
  30.  *    0.3    0.3    0.6    0.7    0.9    0.9    1.1    1.1    0.7    0.7    0.7    1.1    1.5    1.5    1.2    1.2
  0.3     1.    0.9    0.7
  40.  *    0.3    0.3    0.6    0.6    0.7    0.9     1.    1.1    0.7    0.7    0.7    0.7    1.4    1.5    1.3    1.2
  0.6    1.1     1.    0.8
  50.  *    0.3    0.2    0.6    0.6    0.7    0.8     1.    1.1     1.    0.6    0.9    0.8    1.3    1.4    1.3    1.2
  0.5    1.2    1.1     1.
  60.  *    0.1    0.1    0.3    0.5    0.6    0.8    0.9    1.2    1.2    0.8    0.9     1.    1.2    1.5    1.2    1.1
  0.5    1.2    1.2    1.1
  70.  *    0.1    0.1    0.3    0.4    0.4    0.7    0.9    1.1    1.1    1.1    1.1    1.2    1.2    1.4    1.5    1.3
  0.4    1.3    1.2     1.
  80.  *    0.1    0.1    0.3    0.4    0.4    0.5    0.8    0.9    1.2    1.1     1.    1.1    1.5    1.4    1.3    1.2
  0.3    1.5    1.4    1.3
  90.  *    0.1    0.1    0.2    0.4    0.4    0.4    0.5    0.6    0.9    0.9    0.8    0.9    1.1    1.3    1.2     1.
  0.1    1.5    1.4    1.3
 100.  *     0.     0.    0.1    0.3    0.3    0.4    0.4    0.6    0.8    0.7    0.6    0.7    0.7    0.7    0.5    0.3
 0.    0.6    0.5    0.4
 110.  *     0.     0.     0.    0.2    0.3    0.3    0.4    0.6    0.6    0.5    0.4    0.5    0.2    0.3    0.1     0.
 0.    0.1    0.1    0.1
 120.  *     0.     0.     0.    0.2    0.3    0.3    0.5    0.5    0.6    0.5    0.4    0.4    0.3    0.2    0.2     0.
 0.     0.     0.     0.
 130.  *     0.     0.     0.    0.1    0.3    0.3    0.4    0.5    0.6    0.6    0.4    0.3    0.2    0.2     0.     0.
 0.     0.     0.     0.
 140.  *     0.     0.     0.    0.1    0.2    0.3    0.4    0.4    0.6    0.5    0.5    0.2    0.1    0.1     0.     0.
 0.     0.     0.     0.
 150.  *     0.     0.     0.    0.1    0.2    0.3    0.4    0.5    0.5    0.5    0.3    0.1    0.1     0.     0.     0.
 0.     0.     0.     0.
 160.  *     0.     0.     0.    0.1    0.2    0.2    0.4    0.4    0.4    0.3    0.1    0.1     0.     0.     0.     0.
 0.1    0.     0.     0.
 170.  *     0.     0.     0.    0.1    0.1    0.2    0.3    0.3    0.3    0.2    0.1     0.     0.     0.     0.     0.
 0.1    0.     0.     0.
 180.  *     0.     0.     0.    0.1    0.1    0.1    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.
 0.2    0.     0.     0.
 190.  *     0.     0.     0.     0.    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.
 0.4    0.     0.     0.
```

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200.  *     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.     0.     0.     0.     0.     0.     0.
0.4     0.     0.     0.
210.  *     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.     0.     0.     0.     0.     0.
0.5     0.     0.     0.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.4     0.     0.     0.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.4     0.     0.     0.
240.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.4     0.     0.     0.
250.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.4     0.     0.     0.
260.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.
0.4     0.     0.     0.
270.  *    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.5    0.6    0.4    0.1    0.1
0.5    0.1    0.1     0.
280.  *    0.2    0.2     0.     0.     0.     0.     0.     0.     0.1    0.2    0.7    0.9     1.    0.9    0.4    0.2
0.6    0.2    0.2    0.1
290.  *    0.2    0.2     0.     0.     0.     0.     0.1    0.2    0.3    0.6    1.1    1.4    1.4    1.3    0.7    0.4
0.9    0.3    0.2    0.2
300.  *    0.3    0.2     0.     0.     0.1    0.1    0.3    0.3    0.7     1.    1.3    1.5    1.6    1.5     1.    0.6
1.    0.4    0.3    0.2
310.  *    0.6    0.5    0.1    0.2    0.3    0.3    0.4    0.7    0.7     1.    1.2    1.4    1.5    1.4    1.2    0.8
1.3    0.6    0.3    0.3
320.  *    0.7    0.6    0.4    0.4    0.4    0.4    0.5    0.7    0.8    0.9    1.2    1.4    1.4    1.4    1.3    0.9
1.3    0.6    0.3    0.3
330.  *    0.7    0.7    0.4    0.4    0.4    0.4    0.5    0.5    0.7    0.8     1.    1.3    1.4    1.4    1.1    0.9
1.2    0.7    0.4    0.3
340.  *    0.8    0.8    0.5    0.5    0.5    0.6    0.8    0.8    0.8    0.8    0.9    1.3    1.3    1.3    1.1     1.
1.1    0.9    0.4    0.3
350.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.7    0.8    0.8    1.3    1.3    1.3    1.1     1.
0.9    0.9    0.5    0.4
360.  *    0.4    0.3    0.9    0.9    0.9    0.7    0.7    0.5     1.    0.9    1.1    1.3    1.4    1.4    1.1     1.
0.8    0.9    0.6    0.4

------*-------------------------------------------------------------------------------------------------------------------
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MAX   *    0.8    0.8    0.9    0.9    0.9    0.9    1.1    1.2    1.2    1.1    1.3    1.5    1.6    1.5    1.5    1.3
1.3    1.5    1.4    1.3
DEGR. *    340    340      0      0      0     10     30     60     60     70    300    300     20     30     70     70
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310 80 80 80

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88
.	0.3	0.3	0.1	0.	0.	0.	0.	0.
10.	0.4	0.3	0.2	0.	0.	0.	0.	0.
20.	0.5	0.4	0.2	0.	0.	0.	0.	0.
30.	0.6	0.5	0.5	0.	0.1	0.1	0.1	0.1
40.	0.7	0.6	0.5	0.1	0.1	0.1	0.1	0.1
50.	0.9	0.8	0.6	0.1	0.1	0.1	0.1	0.2
60.	1.	0.9	0.8	0.1	0.1	0.1	0.1	0.2
70.	1.	0.9	0.8	0.1	0.1	0.1	0.2	0.2
80.	1.3	1.4	1.2	0.1	0.1	0.1	0.2	0.3
90.	1.3	1.2	1.1	0.4	0.4	0.6	0.7	0.8
100.	0.4	0.4	0.4	1.	1.2	1.3	1.4	1.4
110.	0.1	0.1	0.1	0.9	1.	1.2	1.5	1.6
120.	0.	0.	0.	0.7	0.8	1.	1.1	1.2
130.	0.	0.	0.	0.5	0.7	0.8	1.	1.1
140.	0.	0.	0.	0.4	0.5	0.6	0.9	1.
150.	0.	0.	0.	0.2	0.3	0.5	0.7	0.9
160.	0.	0.	0.	0.2	0.2	0.3	0.6	0.8
170.	0.	0.	0.	0.2	0.2	0.2	0.4	0.8
180.	0.	0.	0.	0.1	0.2	0.2	0.3	0.6
190.	0.	0.	0.	0.	0.1	0.2	0.2	0.5
200.	0.	0.	0.	0.	0.1	0.2	0.2	0.4
210.	0.	0.	0.	0.	0.	0.1	0.2	0.3
220.	0.	0.	0.	0.	0.	0.1	0.1	0.3

230.	*	0.	0.	0.	0.	0.	0.	0.1	0.2
240.	*	0.	0.	0.	0.	0.	0.	0.	0.2
250.	*	0.	0.	0.	0.	0.	0.	0.	0.1
260.	*	0.	0.	0.	0.	0.	0.	0.	0.
270.	*	0.	0.	0.	0.	0.	0.	0.	0.
280.	*	0.1	0.	0.	0.	0.	0.	0.	0.
290.	*	0.1	0.	0.	0.	0.	0.	0.	0.
300.	*	0.2	0.	0.	0.	0.	0.	0.	0.
310.	*	0.2	0.1	0.	0.	0.	0.	0.	0.
320.	*	0.2	0.1	0.	0.	0.	0.	0.	0.
330.	*	0.3	0.1	0.	0.	0.	0.	0.	0.
340.	*	0.3	0.2	0.	0.	0.	0.	0.	0.
350.	*	0.3	0.2	0.1	0.	0.	0.	0.	0.
360.	*	0.3	0.3	0.1	0.	0.	0.	0.	0.
MAX	*	1.3	1.4	1.2	1.	1.2	1.3	1.5	1.6
DEGR.	*	80	80	80	100	100	100	110	110

THE HIGHEST CONCENTRATION OF 1.60 ppm OCCURRED AT RECEPTOR REC73.

FF

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**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/6/2012 5:14:06 PM
** File: F:\2975 FirstLight\Microscale\Worst\49 Rte 44 & Orchard LOS&ADT\2012EXSA.ou2
**
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: FirstLight-Taunton-Rte 44 & Orchard St- Existing Saturday RUN: CAL3QHC RUN

DATE : 12/ 6/12
TIME : 17:14: 4

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE	VPH	EF	H	W	V/C	QUEUE
	*	X1	Y1	X2	Y2	*	(M)								
	*	(DEG)	(G/MI)	(M)	(M)		(VEH)								
1. EBTL	*	238118.14	850750.62	238199.34	850742.50	*	82.	96.	AG	1221.	8.7	0.0	13.4		
2. EBTLQ	*	238199.34	850742.50	238140.67	850748.38	*	59.	276.	AG	130.	100.0	0.0	7.4	0.71	9.8
3. EBRL	*	238167.22	850742.50	238197.22	850740.06	*	30.	95.	AG						

276. 8.7 0.0 9.0								
4. EBRLQ	*	238197.22	850740.06	238170.62	850742.25	*	27.	275. AG
65. 100.0 0.0 3.0 0.32 4.4								
5. WBLT	*	238300.23	850741.88	238230.86	850748.50	*	70.	275. AG
1234. 8.7 0.0 13.4								
6. WBLTQ	*	238230.86	850748.50	238319.22	850740.06	*	89.	95. AG
157. 100.0 0.0 7.4 0.93 14.8								
7. WBRL	*	238299.03	850746.69	238231.45	850754.00	*	68.	276. AG
134. 8.7 0.0 9.4								
8. WBRLQ	*	238231.45	850754.00	238243.89	850752.62	*	13.	96. AG
63. 100.0 0.0 3.4 0.15 2.1								
9. NBLL	*	238225.09	850675.19	238217.52	850730.06	*	55.	352. AG
289. 8.7 0.0 9.7								
10. NBLLQ	*	238217.52	850730.06	238222.98	850690.44	*	40.	172. AG
93. 100.0 0.0 3.7 0.63 6.7								
11. NBTR	*	238229.05	850675.50	238221.16	850730.06	*	55.	352. AG
132. 8.7 0.0 10.0								
12. NBTRQ	*	238221.16	850730.06	238224.20	850708.94	*	21.	172. AG
109. 100.0 0.0 4.0 0.56 3.6								
13. SBLL	*	238200.86	850837.00	238209.34	850762.75	*	75.	173. AG
152. 8.7 0.0 9.7								
14. SBLLQ	*	238209.34	850762.75	238206.61	850786.69	*	24.	353. AG
107. 100.0 0.0 3.7 0.57 4.0								
15. SBTR	*	238200.25	850836.69	238204.80	850763.69	*	73.	176. AG
205. 8.7 0.0 9.7								
16. SBTRQ	*	238204.80	850763.69	238189.27	851013.00	*	250.	356. AG
116. 100.0 0.0 3.7 1.44 41.6								
17. EBOUT	*	238232.06	850738.25	238299.34	850731.56	*	68.	96. AG
1349. 8.7 0.0 13.4								
18. WBOUT	*	238198.44	850754.25	238133.30	850759.44	*	65.	275. AG
1637. 8.7 0.0 13.4								
19. NBOUT	*	238213.58	850762.50	238204.19	850836.12	*	74.	353. AG
290. 8.7 0.0 9.4								
20. SBOUT	*	238209.64	850730.62	238221.16	850675.50	*	56.	168. AG
367. 8.7 0.0 9.0								
21. EBL	*	238199.95	850742.50	238213.77	850761.88	*	24.	35. AG
72. 9.7 0.0 9.0								
22. EBT	*	238199.77	850742.12	238231.58	850738.50	*	32.	97. AG
1149. 8.7 0.0 12.0								
23. EBR	*	238197.95	850740.06	238209.58	850731.88	*	14.	125. AG

276. 10.8 0.0 9.0
24. WBL * 238229.97 850749.00 238209.77 850732.31 * 26. 230. AG
18. 9.7 0.0 9.0
25. WBT * 238230.06 850748.75 238197.77 850754.25 * 33. 280. AG
1216. 8.7 0.0 12.0
26. WBR * 238230.81 850753.88 238213.69 850760.75 * 18. 292. AG
134. 10.8 0.0 9.0
27. NBL * 238217.69 850731.38 238199.09 850754.06 * 29. 321. AG
289. 9.7 0.0 9.0
28. NBT * 238221.11 850730.94 238214.62 850761.75 * 31. 348. AG
84. 8.7 0.0 9.0
29. NBR * 238221.39 850730.06 238232.73 850737.88 * 14. 55. AG
48. 10.8 0.0 9.0
30. SBL * 238209.11 850762.25 238229.58 850738.81 * 31. 139. AG
152. 9.7 0.0 9.0
31. SBT * 238205.02 850763.12 238209.02 850733.38 * 30. 172. AG
73. 8.7 0.0 9.0
32. SBR * 238204.53 850762.81 238192.25 850754.06 * 15. 235. AG
132. 10.8 0.0 9.0

FF

JOB: FirstLight-Taunton-Rte 44 & Orchard St- Existing Saturday RUN: CAL3QHC
RUN

DATE : 12/ 6/12
TIME : 17:14: 4

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. EBTLQ	*	120	58	6.0	1221	1900	50.22	3	3
4. EBRLQ	*	120	58	6.0	276	1900	50.22	3	3
6. WBLTQ	*	120	70	6.0	1234	1900	50.22	3	3
8. WBRLQ	*	120	56	6.0	134	1900	50.22	3	3
10. NBLLQ	*	120	83	6.0	289	1900	50.22	3	3

12. NBTRQ	*	120	97	6.0	132	1900	50.22	3	3
14. SBLLQ	*	120	95	6.0	152	1900	50.22	3	3
16. SBTRQ	*	120	103	6.0	205	1900	50.22	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. R_001	*	238196.62	850836.38	1.8	*
2. R_002	*	238196.92	850831.56	1.8	*
3. R_003	*	238196.62	850826.12	1.8	*
4. R_004	*	238196.92	850820.31	1.8	*
5. R_005	*	238196.92	850814.25	1.8	*
6. R_006	*	238197.52	850809.12	1.8	*
7. R_007	*	238199.05	850801.56	1.8	*
8. R_008	*	238198.44	850795.50	1.8	*
9. R_009	*	238199.95	850788.25	1.8	*
10. R_010	*	238201.45	850782.44	1.8	*
11. R_011	*	238201.77	850776.12	1.8	*
12. R_012	*	238200.25	850770.62	1.8	*
13. R_013	*	238196.92	850764.88	1.8	*
14. R_014	*	238191.77	850762.19	1.8	*
15. R_015	*	238184.80	850761.56	1.8	*
16. R_016	*	238176.62	850761.56	1.8	*
17. R_017	*	238169.66	850762.19	1.8	*
18. R_018	*	238161.77	850763.38	1.8	*
19. R_019	*	238155.41	850764.88	1.8	*
20. R_020	*	238208.12	850837.00	1.8	*
21. R_021	*	238207.22	850832.19	1.8	*
22. R_022	*	238208.44	850824.88	1.8	*
23. R_023	*	238209.34	850820.94	1.8	*
24. R_024	*	238209.95	850814.88	1.8	*
25. R_025	*	238210.55	850807.31	1.8	*
26. R_026	*	238210.86	850800.62	1.8	*
27. R_027	*	238211.77	850794.56	1.8	*

FF

RECEPTOR	COORDINATES (M) X	Y	Z
28. R_028	238212.98	850785.50	1.8
29. R_029	238214.48	850776.69	1.8
30. R_030	238216.61	850768.81	1.8
31. R_031	238220.86	850762.75	1.8
32. R_032	238225.41	850759.12	1.8
33. R_033	238232.38	850757.62	1.8
34. R_034	238239.95	850756.69	1.8
35. R_035	238249.64	850756.44	1.8
36. R_036	238257.22	850755.19	1.8
37. R_037	238266.31	850754.56	1.8
38. R_038	238274.19	850754.25	1.8
39. R_039	238282.38	850754.00	1.8
40. R_040	238289.34	850753.38	1.8
41. R_041	238295.41	850753.38	1.8
42. R_042	238299.64	850752.75	1.8
43. R_043	238299.34	850724.56	1.8
44. R_044	238292.06	850725.50	1.8
45. R_045	238284.19	850726.44	1.8
46. R_046	238275.70	850727.31	1.8
47. R_047	238267.81	850728.25	1.8
48. R_048	238261.16	850729.44	1.8
49. R_049	238254.48	850730.62	1.8
50. R_050	238247.81	850731.56	1.8
51. R_051	238240.55	850731.88	1.8
52. R_052	238234.48	850730.94	1.8
53. R_053	238229.95	850728.25	1.8
54. R_054	238227.52	850725.19	1.8
55. R_055	238226.31	850719.12	1.8
56. R_056	238226.92	850712.19	1.8
57. R_057	238228.44	850700.38	1.8
58. R_058	238229.05	850695.50	1.8
59. R_059	238229.95	850690.06	1.8
60. R_060	238230.55	850685.19	1.8
61. R_061	238231.16	850680.06	1.8
62. R_062	238232.06	850675.50	1.8
63. R_063	238217.52	850675.50	1.8
64. R_064	238216.61	850680.62	1.8

65. R_065	*	238215.09	850687.00	1.8 *
66. R_066	*	238213.89	850695.19	1.8 *
67. R_067	*	238212.98	850704.31	1.8 *
68. R_068	*	238211.45	850710.94	1.8 *
69. R_069	*	238208.73	850719.75	1.8 *
70. R_070	*	238205.70	850726.12	1.8 *
71. R_071	*	238202.06	850731.56	1.8 *
72. R_072	*	238194.80	850734.88	1.8 *
73. R_073	*	238186.92	850736.44	1.8 *
74. R_074	*	238179.95	850737.00	1.8 *
75. R_075	*	238171.77	850736.12	1.8 *
76. R_076	*	238164.50	850735.19	1.8 *
77. R_077	*	238227.22	850707.00	1.8 *
78. R_078	*	238146.92	850739.44	1.8 *
79. R_079	*	238138.44	850740.06	1.8 *

FF

JOB: FirstLight-Taunton-Rte 44 & Orchard St- Existing Saturday RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
80. R_080	*	238132.08	850740.38	1.8 *
81. R_081	*	238126.62	850741.56	1.8 *
82. R_082	*	238121.17	850741.88	1.8 *
83. R_083	*	238117.23	850741.88	1.8 *
84. R_084	*	238117.53	850767.94	1.8 *
85. R_085	*	238122.08	850768.25	1.8 *
86. R_086	*	238127.83	850767.00	1.8 *
87. R_087	*	238131.77	850766.38	1.8 *
88. R_088	*	238135.11	850766.12	1.8 *

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
	* REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
REC17	REC18	REC19	REC20													
.	* 0.5	0.5	0.4	0.5	0.5	0.5	0.6	0.6	0.7	1.	1.	0.6	0.3	0.2	0.1	0.1
0.1	0.	0.	0.2													
10.	* 0.6	0.6	0.6	0.6	0.6	0.6	0.9	0.8	0.9	1.1	1.2	0.8	0.5	0.3	0.2	0.1
0.1	0.1	0.1	0.1													
20.	* 0.5	0.5	0.6	0.6	0.5	0.8	0.8	0.8	0.9	1.	1.1	0.9	0.6	0.2	0.2	0.1
0.1	0.1	0.1	0.													
30.	* 0.5	0.5	0.5	0.6	0.6	0.7	0.8	0.7	0.8	0.9	1.1	0.8	0.6	0.3	0.2	0.1
0.1	0.1	0.1	0.													
40.	* 0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.6	0.6	0.9	0.9	0.8	0.7	0.3	0.3	0.2
0.2	0.1	0.1	0.													
50.	* 0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.8	0.9	0.8	0.6	0.3	0.3	0.2
0.2	0.2	0.1	0.													
60.	* 0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.8	0.9	0.7	0.5	0.3	0.3	0.3
0.3	0.2	0.1	0.													
70.	* 0.3	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.8	0.9	0.7	0.4	0.2	0.3	0.3
0.3	0.3	0.2	0.													
80.	* 0.3	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.8	0.9	0.7	0.4	0.2	0.3	0.4
0.4	0.4	0.2	0.													
90.	* 0.3	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.7	0.9	0.9	0.7	0.5	0.6	0.5	0.7
0.7	0.7	0.6	0.													
100.	* 0.3	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.7	1.	1.1	0.9	0.7	0.7	0.9	1.2
1.1	1.1	0.9	0.													
110.	* 0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	1.	1.1	1.3	1.1	0.8	1.	1.1	1.2
1.3	1.4	1.3	0.													
120.	* 0.6	0.7	0.5	0.6	0.6	0.6	0.8	0.8	1.2	1.3	1.3	1.1	0.7	0.9	1.1	1.1
1.1	1.3	1.1	0.													
130.	* 0.8	0.8	0.9	0.9	0.9	0.9	1.	1.	1.3	1.5	1.4	1.1	0.6	0.9	1.	1.
1.1	1.1	1.1	0.1													
140.	* 1.	1.	1.	1.	1.	1.	1.2	1.1	1.5	1.6	1.3	0.9	0.6	0.9	1.	1.1
1.	1.	0.9	0.2													
150.	* 1.1	1.1	1.	1.	1.	1.1	1.2	1.3	1.4	1.3	1.2	0.5	0.8	1.	1.1	1.

```
 1.     1.    0.9    0.3
 160.  *    0.8    0.8    0.8    0.9    0.9     1.    1.2    0.9     1.    1.1    1.1    0.6    0.6    0.9    0.9     1.
 1.    0.9    0.8    0.3
 170.  *    0.7    0.8    0.8    0.8    0.6    0.7    0.8    0.7    0.7    0.9    0.9    0.5    0.8    0.8    0.9     1.
 0.9    0.8    0.8    0.2
 180.  *    0.6    0.5    0.4    0.4    0.4    0.5    0.7    0.6    0.8    0.9    0.8    0.6    0.7     1.     1.     1.
 0.9    0.9    0.9    0.4
 190.  *    0.5    0.5    0.4    0.4    0.4    0.4    0.5    0.3    0.5    0.7    0.6    0.5    0.8     1.     1.    0.9
 0.9    0.9    0.9    0.8
 200.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.5    0.4    0.4    0.9    0.9    0.9    0.9
 0.9    0.8    0.8    0.9
 210.  *    0.2    0.2    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.7    0.9    0.9    0.9    0.9
 0.9    0.9    0.8    0.9
 220.  *    0.1    0.1    0.2    0.2    0.2    0.3    0.3    0.4    0.4    0.4    0.4    0.7    0.9    0.9    0.9    0.9
 0.9    0.9    0.8    0.7

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.1    1.1     1.     1.     1.    1.1    1.2    1.3    1.5    1.6    1.4    1.1    0.9     1.    1.1    1.2
 1.3    1.4    1.3    0.9
 DEGR. *    150    150    140    140    140    150    140    150    140    140    130    110    200    110    110    100
 110    110    110    200
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC1   REC2   REC3   REC4   REC5   REC6   REC7   REC8   REC9   REC10  REC11  REC12  REC13  REC14  REC15  REC16
 REC17  REC18  REC19  REC20

 ------*-------------------------------------------------------------------------------------------------------------------
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---------------------
230.  *     0.     0.     0.    0.1    0.2    0.2    0.2    0.3    0.4    0.4    0.6    0.7    0.8    0.9     1.    0.9
0.9    0.9    0.8    0.4
240.  *     0.     0.     0.     0.     0.     0.     0.1    0.2    0.4    0.4    0.5    0.6    0.9     1.     1.     1.
1.    0.9    0.7    0.3
250.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.4    0.5    0.9     1.    1.1     1.
1.    0.8    0.6    0.3
260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.7     1.     1.     1.
0.8    0.7    0.5    0.2
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.4    0.6    0.7    0.8
0.7    0.5    0.3    0.2
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.4    0.5
0.4    0.3    0.2    0.2
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3
0.2    0.2    0.1    0.2
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1
0.1    0.1     0.    0.2
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1
0.1    0.1     0.    0.3
320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1
0.1    0.1     0.    0.3
330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1     0.     0.     0.     0.     0.1
0.1     0.     0.    0.3
340.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.3    0.1     0.     0.     0.     0.
0.     0.     0.    0.3
350.  *    0.3    0.3    0.3    0.3    0.2    0.3    0.4    0.4    0.4    0.6    0.6    0.4    0.2    0.1     0.     0.     0.
0.     0.     0.    0.3
360.  *    0.5    0.5    0.4    0.5    0.5    0.5    0.6    0.6    0.7     1.     1.    0.6    0.3    0.2    0.1    0.1
0.1     0.     0.    0.2

------*-----------------------------------------------------------------------------------------------------------------
---------------------
MAX   *    1.1    1.1     1.     1.     1.    1.1    1.2    1.3    1.5    1.6    1.4    1.1    0.9     1.    1.1    1.2
1.3    1.4    1.3    0.9
DEGR. *    150    150    140    140    140    150    140    150    140    140    130    110    200    110    110    100
110    110    110    200

      MODEL RESULTS
      -------------
```

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
.	* 0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.
10.	* 0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20.	* 0.	0.	0.	0.	0.	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
40.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MAX	* 0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.
DEGR.	* 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
50.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
60.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
70.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
80.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.4	0.4	0.2	0.2	0.2	0.1	0.	0.
100.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.5	0.8	0.9	0.8	0.6	0.6	0.3	0.2	0.1
110.	*	0.	0.	0.	0.	0.	0.	0.1	0.2	0.4	0.5	0.9	1.2	1.3	1.1	1.	1.	0.8	0.6	0.4	0.3
120.	*	0.	0.	0.	0.1	0.1	0.2	0.2	0.4	0.5	0.7	1.	1.1	1.4	1.3	1.2	1.2	1.1	0.9	0.6	0.4
130.	*	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.4	0.5	0.6	0.9	1.1	1.4	1.3	1.2	1.2	1.2	0.9	0.8	0.6
140.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.8	0.9	1.2	1.1	1.	1.	1.	0.9	0.8	0.6
150.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.7	0.8	1.1	1.1	0.9	0.9	0.9	0.9	0.9	0.8
160.	*	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.7	0.6	1.1	1.1	0.9	0.9	0.9	0.9	0.9	0.8
170.	*	0.3	0.4	0.3	0.4	0.4	0.5	0.4	0.3	0.5	0.5	0.6	0.6	1.	1.1	0.9	0.9	0.9	0.9	0.9	0.9
180.	*	0.7	0.7	0.6	0.5	0.6	0.6	0.7	0.4	0.5	0.6	0.6	0.7	0.9	1.1	0.9	0.9	0.9	0.9	0.9	0.9
190.	*	0.8	0.8	0.9	0.8	0.9	0.9	0.7	0.6	0.5	0.4	0.6	0.7	1.	1.1	0.9	0.9	0.9	0.9	0.9	0.9

```
200.  *    0.9    0.9    0.9    0.9     1.    0.9    1.1    0.9    0.7    0.4    0.5    0.6    0.9    1.3    0.9    0.9
0.9    0.9    0.9    0.9
210.  *    0.9    0.9    0.9    0.9    0.9     1.     1.    1.1    0.8    0.6    0.5    0.5    0.5    1.2    1.1    0.9
0.9    0.9    0.9    0.9
220.  *    0.8    0.7    0.8    0.8    0.8     1.    0.9     1.    0.8    0.7    0.6    0.5    0.5     1.    1.1    1.1
0.9    0.9    0.9    0.9
230.  *    0.5    0.6    0.6    0.6    0.7    0.7    0.8    1.1    0.9    0.9    0.7    0.6    0.5    0.9     1.    1.1
1.    0.9    0.9    0.9
240.  *    0.5    0.4    0.4    0.4    0.5    0.6    0.6     1.    0.9    1.1    0.7    0.8    0.7     1.     1.    1.1
1.2    1.1    1.1    1.1
250.  *    0.5    0.4    0.3    0.3    0.3    0.3    0.4    0.7    0.9     1.    0.8     1.    0.8     1.    1.1    1.2
1.2    1.1    1.2    1.1
260.  *    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.6    0.8    0.9    0.7    1.1     1.    1.1     1.    1.2
1.2    1.3    1.3    1.4
270.  *    0.5    0.4    0.4    0.3    0.3    0.3    0.3    0.5    0.6    0.7    0.7    0.8    0.7    0.6    0.8    0.9
0.9    0.9    0.9    0.9
280.  *    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.4    0.5    0.6    0.4    0.6    0.6    0.3    0.2    0.3
0.4    0.4    0.3    0.3
290.  *    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.4    0.5    0.5    0.4    0.4    0.4    0.3    0.2    0.2
0.1    0.1    0.1    0.1
300.  *    0.4    0.5    0.4    0.4    0.4    0.4    0.4    0.3    0.5    0.5    0.5    0.2    0.2    0.2    0.2    0.1
0.1    0.1    0.1    0.1
310.  *    0.4    0.5    0.5    0.5    0.5    0.6    0.5    0.5    0.6    0.5    0.5    0.3    0.2    0.2    0.1    0.1
0.1    0.1    0.1    0.1
320.  *    0.4    0.4    0.4    0.5    0.6    0.6    0.6    0.6    0.7    0.5    0.5    0.4    0.3    0.1    0.1    0.1
0.1    0.1    0.1    0.1
330.  *    0.5    0.4    0.4    0.4    0.6    0.6    0.6    0.6    0.7    0.7    0.4    0.4    0.2    0.1    0.1    0.1
0.1    0.1    0.1    0.1
340.  *    0.4    0.5    0.4    0.4    0.4    0.7    0.7    0.7    0.6    0.6    0.4    0.3    0.2    0.1    0.1    0.1
0.1    0.1     0.     0.
350.  *    0.3    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.5    0.4    0.3    0.2    0.1    0.1    0.1     0.
0.     0.     0.     0.
360.  *    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.1    0.1     0.     0.     0.     0.
0.     0.     0.     0.

------*-------------------------------------------------------------------------------------------------------------
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MAX   *    0.9    0.9    0.9    0.9     1.     1.    1.1    1.1    0.9    1.1     1.    1.2    1.4    1.3    1.2    1.2
1.2    1.3    1.3    1.4
DEGR. *    200    200    190    200    200    210    200    210    230    240    120    110    120    120    120    120
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130 260 260 260

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	*	0.	0.	0.6	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.7	0.6	0.4	0.5	0.5	0.6	0.6	0.6
10.	*	0.	0.	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.5	0.6	0.5	0.4	0.3	0.3	0.3	0.3
20.	*	0.	0.	0.4	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.5	0.4	0.3	0.3	0.3	0.3	0.3
30.	*	0.	0.	0.3	0.7	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.6	0.5	0.5	0.3	0.3	0.3	0.3
40.	*	0.	0.	0.2	0.6	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.6	0.6	0.5	0.3	0.3	0.3	0.3
50.	*	0.	0.	0.2	0.5	0.8	0.9	0.9	0.9	1.	1.	1.	0.9	0.9	0.7	0.6	0.5	0.3	0.3	0.3	0.3
60.	*	0.	0.	0.1	0.4	0.7	0.9	1.	1.	1.1	1.1	1.1	1.	0.9	0.7	0.6	0.5	0.3	0.3	0.2	0.2
70.	*	0.	0.	0.	0.3	0.6	0.8	0.9	1.	1.1	1.1	1.1	1.	0.9	0.7	0.5	0.4	0.2	0.	0.	0.
80.	*	0.	0.	0.	0.2	0.4	0.5	0.8	0.9	0.9	1.1	1.1	1.	0.7	0.6	0.4	0.2	0.	0.	0.	0.
90.	*	0.	0.	0.	0.1	0.3	0.4	0.5	0.6	0.8	0.8	0.8	0.7	0.5	0.3	0.1	0.	0.	0.	0.	0.

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100.  *    0.1     0.     0.     0.1    0.2    0.2    0.3    0.4    0.4    0.5    0.5    0.3    0.1    0.1     0.     0.
0.     0.     0.     0.
110.  *    0.1    0.1     0.     0.     0.1    0.1    0.1    0.2    0.3    0.3    0.3    0.1     0.     0.     0.     0.
0.     0.     0.     0.
120.  *    0.3    0.2     0.     0.     0.1    0.1    0.1    0.1    0.1    0.2    0.1    0.1     0.     0.     0.     0.
0.     0.     0.     0.
130.  *    0.3    0.3     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
140.  *    0.5    0.3     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
150.  *    0.5    0.4     0.     0.     0.     0.     0.     0.     0.1    0.1     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
160.  *    0.7    0.5     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
170.  *    0.6    0.5     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.1
0.1    0.1     0.     0.
180.  *    0.8    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.4    0.5    0.3
0.2    0.1     0.     0.
190.  *    0.8    0.7     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.5    0.8    0.5
0.2    0.2    0.1     0.
200.  *    0.9    0.9     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.5    0.8    0.8    0.6
0.4    0.2    0.2     0.
210.  *    0.9    0.9     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.3    0.6    0.7    0.9    0.7
0.3    0.2    0.1    0.1
220.  *    0.9    0.9     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.4    0.6    0.7    0.8    0.6
0.4    0.3    0.2    0.1
230.  *    0.9    0.9     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.2    0.3    0.6    0.7    0.8    0.7
0.4    0.3    0.2    0.2
240.  *     1.     1.     0.     0.     0.     0.     0.2    0.2    0.3    0.3    0.2    0.3    0.6    0.7    0.7    0.7
0.4    0.4    0.2    0.2
250.  *    1.1    1.1    0.1    0.1    0.1    0.2    0.2    0.3    0.3    0.3    0.3    0.2    0.5    0.7    0.7    0.7
0.4    0.4    0.2    0.2
260.  *    1.2    1.1    0.1    0.1    0.1    0.1    0.3    0.4    0.4    0.5    0.4    0.2    0.4    0.7    0.7    0.8
0.4    0.4    0.2    0.2
270.  *    0.8    0.9    0.3    0.4    0.4    0.6    0.6    0.6    0.6    0.7    0.7    0.5    0.5    0.8    0.7    0.8
0.4    0.4    0.3    0.2
280.  *    0.3    0.3     1.    1.1    1.1     1.    0.9    0.9    0.9     1.    0.9    0.7    0.8    0.9    0.9    0.9
0.4    0.4    0.3    0.2
290.  *     0.     0.    1.1    1.2    1.3    1.3    1.2    1.2     1.     1.    1.1    1.1     1.    0.9    1.2    1.1
0.5    0.4    0.4    0.2
```

```
 300.  *    0.1    0.1     1.    1.1    1.1     1.    1.1    1.1     1.     1.     1.    0.9    0.9     1.    1.4    1.1
 0.7    0.7    0.6    0.4
 310.  *    0.1    0.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.9    0.7    0.7    0.9    1.2    1.3
 0.7    0.7    0.7    0.6
 320.  *    0.1    0.1     1.     1.    1.1    1.1    1.1    1.1     1.     1.    1.1    0.7    0.7    0.6    1.3    1.4
 0.9    0.9    0.9    0.8
 330.  *    0.1    0.1    0.9     1.     1.     1.     1.     1.     1.     1.     1.    0.7    0.7    0.5     1.    1.3
 1.     1.    1.1    0.8
 340.  *     0.     0.    0.8    0.9     1.     1.     1.     1.     1.     1.     1.    0.8    0.8    0.7    0.6     1.
 0.9    0.9    0.8    0.8
 350.  *     0.     0.    0.7    0.9    0.9    0.9    0.9    0.9     1.     1.    1.1    0.8    0.4    0.4    0.5    0.7
 0.7    0.8    0.7    0.7
 360.  *     0.     0.    0.6    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.7    0.7    0.6    0.4    0.5
 0.5    0.6    0.6    0.6

 ------*-------------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *    1.2    1.1    1.1    1.2    1.3    1.3    1.2    1.2    1.1    1.1    1.1    1.1     1.     1.    1.4    1.4
 1.     1.    1.1    0.8
 DEGR. *    260    250    290    290    290    290    290    290     60     60     60    290    290    300    300    320
 330    330    330    320
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
 REC77  REC78  REC79  REC80

 ------*-------------------------------------------------------------------------------------------------------------------
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   .  *    0.6    0.5    0.9    0.9    0.8    0.7    0.6    0.5    0.8    0.8    1.1    1.3    1.4    1.4    1.2     1.
   0.6    0.9    0.6    0.4
  10.  *    0.3    0.3    0.7    0.7    0.8    0.8    0.8    0.6    0.6    0.8    0.9    1.3    1.5    1.5    1.2     1.
  0.5     1.    0.7    0.5
  20.  *    0.3    0.3    0.7    0.9    0.9    0.9    0.9    0.7    0.4    0.6    0.9    1.1    1.4    1.4    1.2     1.
  0.3     1.    0.9    0.6
  30.  *    0.3    0.3    0.6    0.6    0.8    0.8     1.    0.9    0.6    0.6    0.7     1.    1.5    1.5    1.2     1.
  0.4     1.     1.    0.8
  40.  *    0.3    0.3    0.5    0.6    0.7    0.8    0.9     1.    0.6    0.7    0.7    0.8    1.4    1.5    1.2    1.1
  0.5    1.1     1.    0.8
  50.  *    0.2    0.2    0.5    0.5    0.7    0.7     1.     1.    0.8    0.7    0.8    0.8    1.3    1.3    1.5    1.1
  0.5    1.2    1.2     1.
  60.  *     0.     0.    0.3    0.4    0.5    0.7    0.8    1.1    1.2    0.7    0.9     1.    1.2    1.5    1.2    1.1
  0.4    1.2    1.2    1.1
  70.  *     0.     0.    0.2    0.2    0.3    0.6    0.8     1.    1.1     1.     1.    1.1    1.2    1.4    1.4    1.2
  0.3    1.1    1.1    1.1
  80.  *     0.     0.    0.2    0.2    0.2    0.4    0.5    0.8     1.    0.8     1.    1.1    1.2    1.4    1.2    1.1
  0.1    1.4    1.3    1.2
  90.  *     0.     0.    0.1    0.2    0.2    0.4    0.4    0.5    0.8    0.7    0.7    0.8    1.1    1.1    0.9    0.7
  0.    1.3    1.1    1.1
 100.  *     0.     0.     0.    0.2    0.2    0.4    0.4    0.5    0.6    0.5    0.6    0.5    0.5    0.6    0.4    0.3
 0.    0.5    0.5    0.5
 110.  *     0.     0.     0.    0.2    0.2    0.3    0.4    0.4    0.5    0.6    0.4    0.4    0.3    0.3    0.1    0.1
 0.    0.1    0.1    0.1
 120.  *     0.     0.     0.    0.1    0.2    0.3    0.4    0.4    0.5    0.5    0.3    0.3    0.2    0.1    0.1     0.
 0.     0.     0.     0.
 130.  *     0.     0.     0.    0.1    0.2    0.2    0.4    0.4    0.5    0.5    0.4    0.3    0.2    0.1     0.     0.
 0.     0.     0.     0.
 140.  *     0.     0.     0.    0.1    0.2    0.3    0.4    0.5    0.5    0.6    0.4    0.2    0.2     0.     0.     0.
 0.     0.     0.     0.
 150.  *     0.     0.     0.    0.1    0.1    0.3    0.4    0.4    0.4    0.4    0.3    0.2     0.     0.     0.     0.
 0.     0.     0.     0.
 160.  *     0.     0.     0.    0.1    0.1    0.2    0.3    0.4    0.4    0.3    0.2     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 170.  *     0.     0.     0.    0.1    0.1    0.1    0.2    0.2    0.2    0.1    0.1     0.     0.     0.     0.     0.
 0.1    0.     0.     0.
 180.  *     0.     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.
 0.3    0.     0.     0.
 190.  *     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.
 0.3    0.     0.     0.
```

```
200.  *     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.     0.     0.     0.     0.     0.
0.5     0.     0.     0.
210.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.4     0.     0.     0.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.4     0.     0.     0.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.4     0.     0.     0.
240.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.4     0.     0.     0.
250.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.4     0.     0.     0.
260.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.
0.4     0.     0.     0.
270.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.3    0.5    0.3    0.1    0.1
0.4    0.1    0.1     0.
280.  *    0.2    0.2     0.     0.     0.     0.     0.     0.     0.1    0.2    0.7     1.     1.    0.8    0.4    0.2
0.5    0.2    0.2    0.1
290.  *    0.2    0.2     0.     0.     0.     0.     0.1    0.2    0.4    0.5    1.1    1.3    1.3    1.2    0.7    0.4
0.7    0.3    0.2    0.2
300.  *    0.3    0.2     0.     0.     0.1    0.1    0.3    0.3    0.5    0.9    1.2    1.5    1.6    1.3    0.9    0.6
0.9    0.4    0.3    0.2
310.  *    0.6    0.5    0.1    0.3    0.3    0.3    0.3    0.5    0.7    0.8    1.2    1.4    1.5    1.4     1.    0.8
1.    0.6    0.3    0.3
320.  *    0.7    0.7    0.3    0.3    0.3    0.3    0.4    0.6    0.7    0.7    1.1    1.4    1.4    1.4    1.1    0.8
1.3    0.7    0.4    0.3
330.  *    0.8    0.7    0.4    0.4    0.4    0.4    0.4    0.4    0.6    0.8    0.9    1.4    1.4    1.4     1.    0.8
1.2    0.7    0.4    0.3
340.  *    0.9    0.8    0.4    0.4    0.5    0.5    0.7    0.7    0.8    0.7     1.    1.3    1.3    1.3     1.    0.9
1.    0.8    0.4    0.3
350.  *    0.7    0.7    0.5    0.6    0.6    0.5    0.5    0.5    0.7    0.9    0.8    1.3    1.4    1.3    1.1    0.9
0.8    0.9    0.5    0.3
360.  *    0.6    0.5    0.9    0.9    0.8    0.7    0.6    0.5    0.8    0.8    1.1    1.3    1.4    1.4    1.2     1.
0.6    0.9    0.6    0.4

------*-----------------------------------------------------------------------------------------------------------------
--------------------
MAX   *    0.9    0.8    0.9    0.9    0.9    0.9     1.    1.1    1.2     1.    1.2    1.5    1.6    1.5    1.5    1.2
1.3    1.4    1.3    1.2
DEGR. *    340    340      0      0     20     20     30     60     60     70    300    300    300     10     50     70
```

320 80 80 80

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88
.	0.3	0.3	0.1	0.	0.	0.	0.	0.
10.	0.4	0.3	0.2	0.	0.	0.	0.	0.
20.	0.5	0.5	0.3	0.	0.1	0.1	0.1	0.1
30.	0.6	0.5	0.5	0.1	0.1	0.1	0.1	0.1
40.	0.6	0.6	0.5	0.1	0.1	0.1	0.1	0.1
50.	0.9	0.7	0.6	0.1	0.1	0.1	0.1	0.1
60.	1.	0.9	0.9	0.1	0.1	0.1	0.1	0.2
70.	1.1	1.	0.9	0.1	0.1	0.1	0.2	0.2
80.	1.1	1.1	1.	0.1	0.1	0.2	0.3	0.3
90.	1.1	1.	1.	0.3	0.3	0.4	0.5	0.5
100.	0.4	0.3	0.3	0.9	0.9	1.1	1.2	1.2
110.	0.1	0.1	0.1	0.8	0.8	1.1	1.3	1.3
120.	0.	0.	0.	0.8	0.7	0.9	1.	1.1
130.	0.	0.	0.	0.5	0.6	0.8	1.	1.
140.	0.	0.	0.	0.4	0.4	0.7	0.8	0.9
150.	0.	0.	0.	0.2	0.3	0.5	0.7	0.9
160.	0.	0.	0.	0.2	0.2	0.3	0.6	0.7
170.	0.	0.	0.	0.2	0.2	0.2	0.4	0.7
180.	0.	0.	0.	0.1	0.2	0.2	0.3	0.6
190.	0.	0.	0.	0.	0.1	0.2	0.2	0.5
200.	0.	0.	0.	0.	0.1	0.2	0.2	0.4
210.	0.	0.	0.	0.	0.	0.1	0.2	0.3
220.	0.	0.	0.	0.	0.	0.1	0.1	0.3

230.	*	0.	0.	0.	0.	0.	0.	0.1	0.2
240.	*	0.	0.	0.	0.	0.	0.	0.	0.2
250.	*	0.	0.	0.	0.	0.	0.	0.	0.1
260.	*	0.	0.	0.	0.	0.	0.	0.	0.
270.	*	0.	0.	0.	0.	0.	0.	0.	0.
280.	*	0.1	0.	0.	0.	0.	0.	0.	0.
290.	*	0.1	0.	0.	0.	0.	0.	0.	0.
300.	*	0.2	0.	0.	0.	0.	0.	0.	0.
310.	*	0.2	0.1	0.	0.	0.	0.	0.	0.
320.	*	0.2	0.1	0.	0.	0.	0.	0.	0.
330.	*	0.3	0.1	0.	0.	0.	0.	0.	0.
340.	*	0.3	0.2	0.	0.	0.	0.	0.	0.
350.	*	0.3	0.2	0.1	0.	0.	0.	0.	0.
360.	*	0.3	0.3	0.1	0.	0.	0.	0.	0.
------	*	----------							
MAX	*	1.1	1.1	1.	0.9	0.9	1.1	1.3	1.3
DEGR.	*	70	80	80	100	100	100	110	110

THE HIGHEST CONCENTRATION OF 1.60 ppm OCCURRED AT RECEPTOR REC10.

FF

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*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/7/2012 12:10:54 PM
** File: F:\2975 FirstLight\Microscale\Worst\49 Rte 44 & Orchard LOS&ADT\2022NBAM.ou2
**
*********************************************
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: FirstLight-Taunton-Rte 44 & Orchard St- NoBuild AM RUN: CAL3QHC RUN

DATE : 12/ 7/12
TIME : 12:10:53

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE	VPH	EF	H	W	V/C	QUEUE
	*	X1	Y1	X2	Y2	*	(M)								
	*	(DEG)	(G/MI)	(M)	(M)		(VEH)								
1. EBTL	*	238118.14	850750.62	238199.34	850742.50	*	82.	96.	AG	1436.	8.5	0.0	13.4		
2. EBTLQ	*	238199.34	850742.50	238127.42	850749.69	*	72.	276.	AG	119.	100.0	0.0	7.4	0.84	12.0
3. EBRL	*	238167.22	850742.50	238197.22	850740.06	*	30.	95.	AG						

```
 162.   8.5   0.0    9.0
 4. EBRLQ                          *  238197.22    850740.06   238181.61    850741.31 *      16.   275. AG
 59. 100.0   0.0    3.0 0.19   2.6
 5. WBLT                           *  238300.23    850741.88   238230.86    850748.50 *      70.   275. AG
 789.   8.5   0.0   13.4
 6. WBLTQ                          *  238230.86    850748.50   238276.62    850744.12 *      46.    95. AG
 144. 100.0   0.0    7.4 0.59   7.7
 7. WBRL                           *  238299.03    850746.69   238231.45    850754.00 *      68.   276. AG
 45.   8.5   0.0    9.4
 8. WBRLQ                          *  238231.45    850754.00   238235.62    850753.56 *       4.    97. AG
 57. 100.0   0.0    3.4 0.05   0.7
 9. NBLL                           *  238225.09    850675.19   238217.52    850730.06 *      55.   352. AG
 375.   8.5   0.0    9.7
10. NBLLQ                          *  238217.52    850730.06   238226.62    850664.06 *      67.   172. AG
88. 100.0   0.0    3.7 0.91  11.1
11. NBTR                           *  238229.05    850675.50   238221.16    850730.06 *      55.   352. AG
123.   8.5   0.0   10.0
12. NBTRQ                          *  238221.16    850730.06   238224.17    850709.19 *      21.   172. AG
103. 100.0   0.0    4.0 0.65   3.5
13. SBLL                           *  238200.86    850837.00   238209.34    850762.75 *      75.   173. AG
96.   8.5   0.0    9.7
14. SBLLQ                          *  238209.34    850762.75   238207.56    850778.31 *      16.   353. AG
101. 100.0   0.0    3.7 0.43   2.6
15. SBTR                           *  238200.25    850836.69   238204.80    850763.69 *      73.   176. AG
182.   8.5   0.0    9.7
16. SBTRQ                          *  238204.80    850763.69   238184.66    851087.19 *     324.   356. AG
109. 100.0   0.0    3.7 1.94  54.0
17. EBOUT                          *  238232.06    850738.25   238299.34    850731.56 *      68.    96. AG
1514.   8.5   0.0   13.4
18. WBOUT                          *  238198.44    850754.25   238133.30    850759.44 *      65.   275. AG
1262.   8.5   0.0   13.4
19. NBOUT                          *  238213.58    850762.50   238204.19    850836.12 *      74.   353. AG
186.   8.5   0.0    9.4
20. SBOUT                          *  238209.64    850730.62   238221.16    850675.50 *      56.   168. AG
246.   8.5   0.0    9.0
21. EBL                            *  238199.95    850742.50   238213.77    850761.88 *      24.    35. AG
49.   9.4   0.0    9.0
22. EBT                            *  238199.77    850742.12   238231.58    850738.50 *      32.    97. AG
1387.   8.5   0.0   12.0
23. EBR                            *  238197.95    850740.06   238209.58    850731.88 *      14.   125. AG
```

```
 162.  10.3   0.0    9.0
 24. WBL                          *  238229.97    850749.00   238209.77    850732.31 *      26.   230. AG
 27.   9.4   0.0    9.0
 25. WBT                          *  238230.06    850748.75   238197.77    850754.25 *      33.   280. AG
 762.   8.5   0.0   12.0
 26. WBR                          *  238230.81    850753.88   238213.69    850760.75 *      18.   292. AG
 45.  10.3   0.0    9.0
 27. NBL                          *  238217.69    850731.38   238199.09    850754.06 *      29.   321. AG
 375.   9.4   0.0    9.0
 28. NBT                          *  238221.11    850730.94   238214.62    850761.75 *      31.   348. AG
 92.   8.5   0.0    9.0
 29. NBR                          *  238221.39    850730.06   238232.73    850737.88 *      14.    55. AG
 31.  10.3   0.0    9.0
 30. SBL                          *  238209.11    850762.25   238229.58    850738.81 *      31.   139. AG
 96.   9.4   0.0    9.0
 31. SBT                          *  238205.02    850763.12   238209.02    850733.38 *      30.   172. AG
 57.   8.5   0.0    9.0
 32. SBR                          *  238204.53    850762.81   238192.25    850754.06 *      15.   235. AG
 125.  10.3   0.0    9.0
```

FF PAGE 2

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 JOB: FirstLight-Taunton-Rte 44 & Orchard St- NoBuild AM                RUN: CAL3QHC
 RUN

 DATE : 12/ 7/12
 TIME : 12:10:53

  ADDITIONAL QUEUE LINK PARAMETERS
  --------------------------------
             LINK DESCRIPTION             *    CYCLE    RED     CLEARANCE  APPROACH  SATURATION   IDLE   SIGNAL
             ARRIVAL
                                          *    LENGTH   TIME    LOST TIME    VOL     FLOW RATE   EM FAC   TYPE     RATE
                                          *     (SEC)   (SEC)    (SEC)      (VPH)     (VPH)    (gm/hr)

 ------------------------------------------*-------------------------------------------------------------------------
 ----
  2. EBTLQ                                *     120       58       6.0      1436       1900      45.89      3        3
  4. EBRLQ                                *     120       58       6.0       162       1900      45.89      3        3
  6. WBLTQ                                *     120       70       6.0       789       1900      45.89      3        3
  8. WBRLQ                                *     120       56       6.0        45       1900      45.89      3        3
 10. NBLLQ                                *     120       86       6.0       375       1900      45.89      3        3
```

12. NBTRQ	*	120	100	6.0	123	1900	45.89	3	3
14. SBLLQ	*	120	98	6.0	96	1900	45.89	3	3
16. SBTRQ	*	120	106	6.0	182	1900	45.89	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. R_001	*	238196.62	850836.38	1.8	*
2. R_002	*	238196.92	850831.56	1.8	*
3. R_003	*	238196.62	850826.12	1.8	*
4. R_004	*	238196.92	850820.31	1.8	*
5. R_005	*	238196.92	850814.25	1.8	*
6. R_006	*	238197.52	850809.12	1.8	*
7. R_007	*	238199.05	850801.56	1.8	*
8. R_008	*	238198.44	850795.50	1.8	*
9. R_009	*	238199.95	850788.25	1.8	*
10. R_010	*	238201.45	850782.44	1.8	*
11. R_011	*	238201.77	850776.12	1.8	*
12. R_012	*	238200.25	850770.62	1.8	*
13. R_013	*	238196.92	850764.88	1.8	*
14. R_014	*	238191.77	850762.19	1.8	*
15. R_015	*	238184.80	850761.56	1.8	*
16. R_016	*	238176.62	850761.56	1.8	*
17. R_017	*	238169.66	850762.19	1.8	*
18. R_018	*	238161.77	850763.38	1.8	*
19. R_019	*	238155.41	850764.88	1.8	*
20. R_020	*	238208.12	850837.00	1.8	*
21. R_021	*	238207.22	850832.19	1.8	*
22. R_022	*	238208.44	850824.88	1.8	*
23. R_023	*	238209.34	850820.94	1.8	*
24. R_024	*	238209.95	850814.88	1.8	*
25. R_025	*	238210.55	850807.31	1.8	*
26. R_026	*	238210.86	850800.62	1.8	*
27. R_027	*	238211.77	850794.56	1.8	*

FF

RECEPTOR	COORDINATES (M) X	Y	Z
28. R_028	238212.98	850785.50	1.8
29. R_029	238214.48	850776.69	1.8
30. R_030	238216.61	850768.81	1.8
31. R_031	238220.86	850762.75	1.8
32. R_032	238225.41	850759.12	1.8
33. R_033	238232.38	850757.62	1.8
34. R_034	238239.95	850756.69	1.8
35. R_035	238249.64	850756.44	1.8
36. R_036	238257.22	850755.19	1.8
37. R_037	238266.31	850754.56	1.8
38. R_038	238274.19	850754.25	1.8
39. R_039	238282.38	850754.00	1.8
40. R_040	238289.34	850753.38	1.8
41. R_041	238295.41	850753.38	1.8
42. R_042	238299.64	850752.75	1.8
43. R_043	238299.34	850724.56	1.8
44. R_044	238292.06	850725.50	1.8
45. R_045	238284.19	850726.44	1.8
46. R_046	238275.70	850727.31	1.8
47. R_047	238267.81	850728.25	1.8
48. R_048	238261.16	850729.44	1.8
49. R_049	238254.48	850730.62	1.8
50. R_050	238247.81	850731.56	1.8
51. R_051	238240.55	850731.88	1.8
52. R_052	238234.48	850730.94	1.8
53. R_053	238229.95	850728.25	1.8
54. R_054	238227.52	850725.19	1.8
55. R_055	238226.31	850719.12	1.8
56. R_056	238226.92	850712.19	1.8
57. R_057	238228.44	850700.38	1.8
58. R_058	238229.05	850695.50	1.8
59. R_059	238229.95	850690.06	1.8
60. R_060	238230.55	850685.19	1.8
61. R_061	238231.16	850680.06	1.8
62. R_062	238232.06	850675.50	1.8
63. R_063	238217.52	850675.50	1.8
64. R_064	238216.61	850680.62	1.8

65. R_065	*	238215.09	850687.00	1.8 *
66. R_066	*	238213.89	850695.19	1.8 *
67. R_067	*	238212.98	850704.31	1.8 *
68. R_068	*	238211.45	850710.94	1.8 *
69. R_069	*	238208.73	850719.75	1.8 *
70. R_070	*	238205.70	850726.12	1.8 *
71. R_071	*	238202.06	850731.56	1.8 *
72. R_072	*	238194.80	850734.88	1.8 *
73. R_073	*	238186.92	850736.44	1.8 *
74. R_074	*	238179.95	850737.00	1.8 *
75. R_075	*	238171.77	850736.12	1.8 *
76. R_076	*	238164.50	850735.19	1.8 *
77. R_077	*	238227.22	850707.00	1.8 *
78. R_078	*	238146.92	850739.44	1.8 *
79. R_079	*	238138.44	850740.06	1.8 *

FF

JOB: FirstLight-Taunton-Rte 44 & Orchard St- NoBuild AM RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
80. R_080	*	238132.08	850740.38	1.8 *
81. R_081	*	238126.62	850741.56	1.8 *
82. R_082	*	238121.17	850741.88	1.8 *
83. R_083	*	238117.23	850741.88	1.8 *
84. R_084	*	238117.53	850767.94	1.8 *
85. R_085	*	238122.08	850768.25	1.8 *
86. R_086	*	238127.83	850767.00	1.8 *
87. R_087	*	238131.77	850766.38	1.8 *
88. R_088	*	238135.11	850766.12	1.8 *

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	*	0.5	0.5	0.4	0.5	0.5	0.5	0.6	0.5	0.6	0.8	0.8	0.6	0.3	0.2	0.1	0.1	0.1	0.1	0.
10.	*	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.6	0.7	0.9	0.9	0.6	0.5	0.3	0.2	0.1	0.1	0.1	0.1
20.	*	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.9	0.8	0.6	0.4	0.2	0.2	0.1	0.1	0.1	0.
30.	*	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.5	0.5	0.2	0.2	0.1	0.1	0.1	0.
40.	*	0.4	0.4	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.5	0.3	0.1	0.1	0.1	0.1	0.
50.	*	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.5	0.5	0.5	0.3	0.3	0.1	0.2	0.2	0.1	0.
60.	*	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.4	0.3	0.2	0.2	0.2	0.2	0.
70.	*	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.4	0.2	0.3	0.3	0.2	0.2	0.
80.	*	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.6	0.6	0.3	0.2	0.3	0.4	0.3	0.3	0.
90.	*	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.6	0.6	0.4	0.5	0.5	0.5	0.5	0.4	0.
100.	*	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.6	0.8	0.6	0.5	0.7	0.9	0.9	0.9	0.
110.	*	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.8	0.9	0.9	0.7	0.8	0.9	0.9	1.	1.1	1.
120.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.7	0.8	0.8	0.9	1.1	0.7	0.8	0.8	1.	0.9	0.9	1.
130.	*	0.6	0.6	0.5	0.5	0.6	0.6	0.8	0.7	0.9	1.1	1.3	1.	0.4	0.8	0.9	0.9	1.	0.9	0.8
140.	*	0.7	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.8	1.2	1.2	0.7	0.5	0.7	0.9	1.	1.	0.9	0.9
150.	*	0.9	0.9	0.8	0.8	0.7	0.7	0.8	0.9	1.	1.2	1.	0.5	0.6	0.9	0.9	1.			

```
 0.9    0.9    0.9    0.2
 160.  *    0.8    0.8    0.5    0.5    0.6    0.7    0.9    0.8    0.9    1.2     1.    0.6    0.6    0.7    0.7    0.8
 0.8    0.8    0.8    0.2
 170.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.7    0.8    0.8     1.    0.9    0.4    0.7    0.6    0.8    0.7
 0.8    0.7    0.7    0.2
 180.  *    0.4    0.4    0.3    0.4    0.5    0.5    0.5    0.5    0.7    0.8    0.7    0.6    0.6    0.8    0.8    0.8
 0.8    0.8    0.7    0.3
 190.  *    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.4    0.5    0.5    0.4    0.5    0.8    0.8    0.8
 0.8    0.8    0.7    0.6
 200.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.3    0.5    0.7    0.7    0.7    0.8
 0.8    0.7    0.7    0.8
 210.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.5    0.5    0.7    0.7    0.8    0.9
 0.8    0.8    0.7    0.8
 220.  *     0.    0.1    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.5    0.6    0.7    0.8    0.9    0.9
 0.9    0.9    0.9    0.7

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.9    0.9    0.8    0.8    0.7    0.8    0.9    0.9     1.    1.2    1.3    1.1    0.7    0.9    0.9     1.
 1.    1.1     1.    0.8
 DEGR. *    150    150    140    140    140    140    160    150    150    140    130    120    110    150    110    120
 110    110    110    200
```



```
       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC1   REC2   REC3   REC4   REC5   REC6   REC7   REC8   REC9   REC10  REC11  REC12  REC13  REC14  REC15  REC16
 REC17  REC18  REC19  REC20

 ------*-------------------------------------------------------------------------------------------------------------------
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230.  *     0.     0.     0.     0.    0.2    0.2    0.3    0.3    0.3    0.4    0.5    0.7    0.7    0.9    0.9    0.9
0.9    0.9    0.8    0.2
240.  *     0.     0.     0.     0.     0.     0.    0.2    0.2    0.3    0.4    0.5    0.7    0.8    0.9     1.     1.
1.     1.    0.7    0.2
250.  *     0.     0.     0.     0.     0.     0.     0.     0.    0.2    0.3    0.4    0.5    0.8     1.     1.     1.
0.9    0.8    0.7    0.2
260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.4    0.6    0.8    0.8    0.8
0.8    0.6    0.4    0.2
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.3    0.6    0.7    0.6
0.6    0.5    0.3    0.2
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.3    0.4
0.3    0.3    0.1    0.2
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.2
0.2    0.1    0.1    0.2
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1
0.1    0.1     0.    0.2
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1
0.1    0.1     0.    0.2
320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1
0.1     0.     0.    0.3
330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.    0.3
340.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.1     0.     0.     0.     0.
0.     0.     0.    0.3
350.  *    0.3    0.3    0.3    0.3    0.2    0.3    0.4    0.4    0.4    0.6    0.6    0.4    0.2    0.1    0.1     0.
0.     0.     0.    0.3
360.  *    0.5    0.5    0.4    0.5    0.5    0.5    0.6    0.5    0.6    0.8    0.8    0.6    0.3    0.2    0.1    0.1
0.1    0.1     0.    0.2

------*-------------------------------------------------------------------------------------------------------------------
---------------------
MAX   *    0.9    0.9    0.8    0.8    0.7    0.8    0.9    0.9     1.    1.2    1.3    1.1    0.8     1.     1.     1.
1.    1.1     1.    0.8
DEGR. *    150    150    140    140    140    140    160    150    150    140    130    120    240    250    240    120
110    110    110    200

      MODEL RESULTS
      -------------
```

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
.	*	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.
10.	*	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
40.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MAX	*	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.
DEGR.	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
50.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
60.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
70.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
80.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.2	0.1	0.1	0.	0.	0.	0.
100.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.3	0.5	0.5	0.5	0.2	0.2	0.1	0.1	0.
110.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.3	0.3	0.5	0.7	0.8	0.8	0.5	0.4	0.3	0.1	0.1	0.
120.	*	0.	0.	0.	0.	0.	0.	0.	0.3	0.3	0.5	0.7	0.9	0.9	0.9	0.7	0.7	0.4	0.3	0.1	0.1
130.	*	0.	0.	0.	0.	0.2	0.3	0.3	0.3	0.5	0.5	0.6	0.9	1.	0.9	0.8	0.7	0.6	0.3	0.3	0.1
140.	*	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.6	0.6	0.7	1.	0.9	0.9	0.9	0.7	0.4	0.3	0.1
150.	*	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.5	0.4	0.5	0.6	0.9	0.9	0.8	0.8	0.7	0.5	0.4	0.3
160.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.5	0.8	0.9	0.7	0.8	0.7	0.5	0.4	0.4
170.	*	0.2	0.2	0.3	0.2	0.2	0.3	0.5	0.4	0.4	0.5	0.5	0.5	0.8	0.8	0.7	0.7	0.7	0.6	0.4	0.4
180.	*	0.4	0.3	0.3	0.3	0.4	0.5	0.5	0.5	0.4	0.5	0.6	0.6	0.7	0.8	0.7	0.7	0.7	0.7	0.4	0.4
190.	*	0.6	0.6	0.5	0.4	0.5	0.6	0.5	0.6	0.4	0.4	0.5	0.6	0.9	0.8	0.7	0.7	0.7	0.7	0.4	0.4

```
200.  *    0.8    0.8    0.8    0.8    0.7    0.7    0.7    0.8    0.6    0.2    0.4    0.5    0.8    0.9    0.8    0.7
0.7    0.7    0.5    0.4
210.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.6    0.8    0.8    0.4    0.5    0.4    0.4    0.9    0.9    0.9
0.8    0.7    0.6    0.4
220.  *    0.7    0.8    0.8    0.7    0.7    0.7    0.6    0.7    0.7    0.7    0.6    0.4    0.4    0.8    1.1    0.9
0.9    0.9    0.6    0.5
230.  *    0.5    0.5    0.5    0.5    0.6    0.6    0.6    0.8     1.    0.6    0.5    0.7    0.4    0.7    0.7    0.9
0.9    0.9    0.7    0.7
240.  *    0.3    0.3    0.3    0.3    0.5    0.4    0.5    0.5     1.     1.    0.6    0.5    0.6    0.7    0.8    0.8
0.9    0.8    0.8    0.6
250.  *    0.2    0.2    0.3    0.2    0.2    0.2    0.3    0.5    0.8    0.9    0.7    0.8    0.7    0.9    0.8     1.
0.9    0.9    0.9    0.8
260.  *    0.2    0.2    0.3    0.2    0.2    0.2    0.2    0.3    0.6    0.8    0.6    0.8    0.7    0.8    0.7    0.9
1.     1.    0.9    0.9
270.  *    0.2    0.2    0.3    0.2    0.2    0.2    0.2    0.2    0.4    0.7    0.6    0.5    0.5    0.4    0.5    0.7
0.7    0.8    0.7    0.7
280.  *    0.2    0.2    0.3    0.3    0.2    0.2    0.2    0.2    0.3    0.5    0.3    0.3    0.3    0.3    0.3    0.2
0.3    0.3    0.3    0.2
290.  *    0.2    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.4    0.5    0.2    0.2    0.2    0.2    0.1    0.1
0.1    0.1    0.1     0.
300.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.5    0.4    0.2    0.2    0.2    0.1    0.1
0.1    0.1    0.1    0.1
310.  *    0.3    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.5    0.4    0.2    0.2    0.1    0.1    0.1
0.1    0.1    0.1    0.1
320.  *    0.3    0.4    0.4    0.4    0.5    0.5    0.5    0.3    0.3    0.4    0.4    0.3    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
330.  *    0.3    0.4    0.4    0.4    0.4    0.5    0.5    0.4    0.4    0.4    0.4    0.2    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
340.  *    0.4    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.1    0.1    0.1
0.1    0.1    0.1     0.
350.  *    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.1    0.1    0.1    0.1
0.     0.     0.     0.
360.  *    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1    0.1     0.     0.     0.
0.     0.     0.     0.

------*-------------------------------------------------------------------------------------------------------------
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MAX   *    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.8     1.     1.    0.7    0.9     1.    0.9    1.1     1.
1.     1.    0.9    0.9
DEGR. *    200    200    200    200    210    210    200    200    230    240    120    120    130    120    220    250
```

260 260 250 260

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	*	0.	0.	0.3	0.5	0.5	0.6	0.7	0.8	0.8	0.8	0.7	0.8	0.7	0.5	0.4	0.3	0.5	0.5	0.5	0.6
10.	*	0.	0.	0.1	0.5	0.5	0.6	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.5	0.4	0.4	0.2	0.2	0.2	0.2
20.	*	0.	0.	0.1	0.5	0.5	0.5	0.7	0.7	0.8	0.8	0.8	0.7	0.6	0.6	0.4	0.3	0.3	0.3	0.3	0.3
30.	*	0.	0.	0.	0.5	0.5	0.5	0.6	0.7	0.8	0.9	0.8	0.7	0.6	0.6	0.5	0.4	0.4	0.3	0.3	0.3
40.	*	0.	0.	0.	0.3	0.5	0.5	0.6	0.8	0.9	1.	1.	0.7	0.6	0.6	0.5	0.4	0.4	0.3	0.3	0.2
50.	*	0.	0.	0.	0.3	0.5	0.6	0.6	0.8	0.9	1.	1.	1.	0.7	0.6	0.6	0.4	0.4	0.2	0.1	0.1
60.	*	0.	0.	0.	0.2	0.4	0.6	0.6	0.8	0.9	1.	1.	0.9	0.7	0.6	0.5	0.4	0.1	0.1	0.1	0.1
70.	*	0.	0.	0.	0.2	0.4	0.5	0.7	0.7	0.8	0.9	1.	0.9	0.8	0.6	0.5	0.2	0.1	0.1	0.	0.
80.	*	0.	0.	0.	0.2	0.3	0.5	0.5	0.7	0.8	0.9	0.9	0.8	0.7	0.5	0.2	0.1	0.	0.	0.	0.
90.	*	0.	0.	0.	0.1	0.3	0.4	0.5	0.6	0.6	0.8	0.8	0.7	0.3	0.2	0.1	0.	0.	0.	0.	0.

100.	*	0.	0.	0.	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.5	0.4	0.1	0.1	0.	0.
0.	0.	0.	0.														
110.	*	0.	0.	0.	0.	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.2	0.	0.	0.	0.
0.	0.	0.	0.														
120.	*	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.	0.	0.	0.
0.	0.	0.	0.														
130.	*	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.
0.	0.	0.	0.														
140.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.
0.	0.	0.	0.														
150.	*	0.1	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.	0.	0.	0.	0.
0.	0.	0.	0.														
160.	*	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.														
170.	*	0.2	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.3	0.2
0.2	0.1	0.	0.														
180.	*	0.4	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.3	0.6	0.4
0.3	0.3	0.1	0.1														
190.	*	0.4	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.4	0.6	0.7	0.5
0.4	0.4	0.3	0.1														
200.	*	0.4	0.4	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.3	0.5	0.5	0.7	0.5
0.4	0.4	0.3	0.3														
210.	*	0.4	0.4	0.	0.	0.	0.	0.	0.	0.1	0.1	0.2	0.3	0.5	0.6	0.7	0.4
0.3	0.3	0.3	0.3														
220.	*	0.4	0.4	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.3	0.3	0.5	0.6	0.7	0.5
0.3	0.3	0.3	0.3														
230.	*	0.5	0.5	0.	0.	0.	0.	0.1	0.2	0.2	0.3	0.2	0.4	0.4	0.6	0.6	0.5
0.3	0.3	0.3	0.3														
240.	*	0.5	0.6	0.	0.	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.6	0.6	0.6
0.3	0.3	0.3	0.3														
250.	*	0.6	0.6	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.6	0.6	0.6
0.3	0.3	0.3	0.3														
260.	*	0.9	0.7	0.1	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.4	0.2	0.4	0.6	0.6	0.6
0.3	0.3	0.3	0.3														
270.	*	0.7	0.7	0.4	0.4	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.4	0.6	0.8	0.6	0.6
0.3	0.3	0.3	0.3														
280.	*	0.2	0.2	1.1	1.1	1.1	0.9	0.9	0.9	1.	1.	1.	0.9	0.8	0.9	0.8	0.7
0.3	0.3	0.3	0.3														
290.	*	0.	0.	0.9	1.3	1.2	1.2	1.3	1.2	1.1	1.	1.	1.	0.9	1.	1.	0.9
0.4	0.4	0.3	0.4														

```
300.  *    0.1    0.1    0.9    0.9    0.9    0.9    1.1     1.    1.1     1.     1.     1.    0.7     1.    1.3    1.1
0.7    0.6    0.6    0.6
310.  *    0.1    0.1    0.9    1.1    1.2    1.1     1.     1.    1.1     1.    0.7    0.7    0.7    0.8    1.2    1.1
0.6    0.7    0.7    0.7
320.  *    0.1    0.1    0.8    0.9     1.    1.1     1.     1.    0.9     1.    0.9    0.6    0.6    0.7    1.3    1.1
0.9    0.7    0.8    0.8
330.  *    0.1    0.1    0.6    0.8    0.9     1.     1.    1.1    1.1    0.8    0.9    0.7    0.5    0.5     1.    1.3
0.9    0.9    0.9    0.8
340.  *     0.     0.    0.4    0.6    0.7    0.8    0.8    0.8    0.9    0.9    0.8    0.7    0.6    0.6    0.6     1.
0.9    0.8    0.7    0.7
350.  *     0.     0.    0.4    0.5    0.5    0.7    0.7    0.9    0.9    0.9    0.8    0.8    0.5    0.6    0.6    0.6
0.7    0.6    0.6    0.6
360.  *     0.     0.    0.3    0.5    0.5    0.6    0.7    0.8    0.8    0.8    0.7    0.8    0.7    0.5    0.4    0.3
0.5    0.5    0.5    0.6

------*-----------------------------------------------------------------------------------------------------------------
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MAX   *    0.9    0.7    1.1    1.3    1.2    1.2    1.3    1.2    1.1     1.     1.     1.    0.9     1.    1.3    1.3
0.9    0.9    0.9    0.8
DEGR. *    260    260    280    290    290    290    290    290    290     40     40     50    290    290    300    330
320    330    330    320
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

```
WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
REC77  REC78  REC79  REC80

------*-----------------------------------------------------------------------------------------------------------------
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   .  *    0.6    0.5    0.7    0.7    0.6    0.5    0.5    0.6    0.7    0.6    1.    1.2    1.2    1.    1.    0.9
   0.4    0.9    0.9    0.8
  10.  *    0.2    0.2    0.6    0.6    0.6    0.7    0.7    0.6    0.6    0.5    0.9    1.1    1.3    1.1    1.    0.9
  0.4    1.     1.    0.9
  20.  *    0.3    0.2    0.6    0.7    0.7    0.8    0.7    0.5    0.5    0.4    0.7    1.1    1.3    1.1    0.9    0.9
  0.3    1.    0.9    0.9
  30.  *    0.3    0.2    0.6    0.7    0.8    0.8     1.    0.8    0.4    0.5    0.6     1.    1.2    1.1    0.9    0.9
  0.4    1.     1.     1.
  40.  *    0.1    0.1    0.6    0.7    0.7    0.8    0.9     1.    0.7    0.6    0.6    0.7    1.1    1.2    1.     1.
  0.4    1.     1.     1.
  50.  *    0.1    0.1    0.5    0.5    0.5    0.7     1.     1.    0.8    0.7    0.7    0.7    1.1    1.3    1.     1.
  0.4   1.1     1.     1.
  60.  *     0.     0.    0.4    0.5    0.5    0.5    0.9     1.    0.9    0.8    0.9    0.7     1.    1.3    1.1    0.8
  0.3   1.1    1.2    1.2
  70.  *     0.     0.    0.4    0.4    0.4    0.5    0.6     1.    0.9    0.8    0.9    1.1    1.2    1.3    1.2     1.
  0.1   1.1    1.1    1.1
  80.  *     0.     0.    0.3    0.4    0.4    0.4    0.5    0.6    0.9    0.9    0.7    1.1    1.2    1.3    1.2    1.1
  0.1   1.2    1.1     1.
  90.  *     0.     0.    0.3    0.4    0.4    0.4    0.4    0.5    0.7    0.6    0.5    0.9    0.8     1.    0.8    0.6
  0.    0.9     1.     1.
 100.  *     0.     0.    0.2    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.3    0.3    0.4    0.3    0.3    0.3
 0.    0.5    0.4    0.4
 110.  *     0.     0.    0.2    0.4    0.4    0.4    0.4    0.4    0.5    0.4    0.3    0.3    0.5    0.3    0.1    0.1
 0.    0.1    0.1    0.1
 120.  *     0.     0.    0.2    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.4    0.2    0.2    0.1    0.1    0.1
 0.     0.     0.     0.
 130.  *     0.     0.    0.2    0.3    0.4    0.4    0.4    0.4    0.5    0.5    0.4    0.3    0.1    0.1    0.1    0.1
 0.     0.     0.     0.
 140.  *     0.     0.    0.1    0.3    0.4    0.4    0.4    0.4    0.4    0.5    0.4    0.2    0.1    0.1     0.     0.
 0.     0.     0.     0.
 150.  *     0.     0.    0.1    0.2    0.2    0.4    0.4    0.4    0.4    0.4    0.3    0.1    0.1     0.     0.     0.
 0.     0.     0.     0.
 160.  *     0.     0.     0.    0.1    0.2    0.2    0.4    0.4    0.3    0.3    0.2    0.1     0.     0.     0.     0.
 0.     0.     0.     0.
 170.  *     0.     0.     0.     0.    0.1    0.2    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.
 0.3    0.     0.     0.
 180.  *     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.
 0.4    0.     0.     0.
 190.  *    0.1     0.     0.     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.
 0.4    0.     0.     0.
```

```
200.  *    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.5     0.     0.     0.
210.  *    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.3     0.     0.     0.
220.  *    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.3     0.     0.     0.
230.  *    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.3     0.     0.     0.
240.  *    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.3     0.     0.     0.
250.  *    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.
0.3     0.     0.     0.
260.  *    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.
0.3     0.     0.     0.
270.  *    0.3    0.3     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.4    0.4    0.2    0.1
0.3    0.1    0.1     0.
280.  *    0.4    0.3     0.     0.     0.     0.     0.     0.     0.2    0.3    0.5    0.9     1.    0.8    0.5    0.3
0.4    0.4    0.2    0.1
290.  *    0.4    0.3     0.     0.     0.     0.     0.1    0.2    0.4    0.6    0.9    1.3    1.2    1.1    0.8    0.5
0.6    0.6    0.3    0.2
300.  *    0.5    0.5     0.     0.     0.1    0.2    0.2    0.4    0.5    0.6     1.    1.3    1.3    1.3    0.9    0.8
0.9    0.6    0.5    0.3
310.  *    0.7    0.6    0.2    0.2    0.2    0.3    0.4    0.5    0.5    0.8     1.    1.3    1.3    1.2     1.    0.8
0.9    0.7    0.6    0.3
320.  *    0.8    0.7    0.3    0.3    0.3    0.3    0.4    0.4    0.5    0.7    0.9    1.2    1.3    1.2    0.9    0.9
1.    0.8    0.7    0.4
330.  *    0.9    0.8    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.6    0.9     1.    1.2     1.    0.9    0.9
1.    0.8    0.7    0.5
340.  *    0.7    0.7    0.4    0.4    0.5    0.6    0.6    0.6    0.6    0.5    0.8     1.     1.    0.9    0.9    0.8
1.    0.9    0.8    0.5
350.  *    0.6    0.6    0.5    0.4    0.4    0.3    0.3    0.4    0.7    0.9    0.9    1.1    1.2    0.9    0.8    0.8
0.9    0.8    0.7    0.5
360.  *    0.6    0.5    0.7    0.7    0.6    0.5    0.5    0.6    0.7    0.6     1.    1.2    1.2     1.     1.    0.9
0.4    0.9    0.9    0.8

------*-------------------------------------------------------------------------------------------------------------
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MAX   *    0.9    0.8    0.7    0.7    0.8    0.8     1.     1.    0.9    0.9     1.    1.3    1.3    1.3    1.2    1.1
1.    1.2    1.2    1.2
DEGR. *    330    330      0      0     30     20     30     40     60     80      0    290     10     50     70     80
```

320 80 60 60

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88
.	0.5	0.3	0.1	0.	0.	0.	0.	0.
10.	0.7	0.4	0.2	0.	0.	0.	0.	0.1
20.	0.8	0.5	0.4	0.1	0.1	0.1	0.1	0.1
30.	1.	0.7	0.4	0.1	0.1	0.1	0.1	0.1
40.	1.	0.8	0.7	0.1	0.1	0.1	0.1	0.1
50.	1.1	0.9	0.7	0.1	0.1	0.1	0.1	0.1
60.	1.2	1.1	0.9	0.1	0.1	0.1	0.1	0.1
70.	1.1	1.1	1.	0.1	0.1	0.1	0.1	0.2
80.	1.2	1.2	1.1	0.1	0.1	0.1	0.1	0.2
90.	1.1	0.9	0.9	0.2	0.2	0.2	0.3	0.3
100.	0.5	0.4	0.3	0.6	0.6	0.7	0.9	0.9
110.	0.1	0.1	0.1	0.7	0.8	0.9	1.1	1.
120.	0.	0.	0.	0.7	0.8	0.9	1.	1.
130.	0.	0.	0.	0.6	0.7	0.8	0.9	1.
140.	0.	0.	0.	0.5	0.6	0.7	0.8	0.9
150.	0.	0.	0.	0.3	0.5	0.7	0.8	0.9
160.	0.	0.	0.	0.3	0.3	0.6	0.7	0.8
170.	0.	0.	0.	0.2	0.3	0.5	0.7	0.8
180.	0.	0.	0.	0.1	0.2	0.3	0.5	0.7
190.	0.	0.	0.	0.1	0.1	0.3	0.3	0.6
200.	0.	0.	0.	0.	0.1	0.2	0.3	0.4
210.	0.	0.	0.	0.	0.	0.1	0.2	0.4
220.	0.	0.	0.	0.	0.	0.1	0.1	0.3

230.	*	0.	0.	0.	0.	0.	0.	0.1	0.2
240.	*	0.	0.	0.	0.	0.	0.	0.	0.2
250.	*	0.	0.	0.	0.	0.	0.	0.	0.
260.	*	0.	0.	0.	0.	0.	0.	0.	0.
270.	*	0.	0.	0.	0.	0.	0.	0.	0.
280.	*	0.1	0.	0.	0.	0.	0.	0.	0.
290.	*	0.1	0.	0.	0.	0.	0.	0.	0.
300.	*	0.2	0.	0.	0.	0.	0.	0.	0.
310.	*	0.2	0.1	0.	0.	0.	0.	0.	0.
320.	*	0.3	0.1	0.	0.	0.	0.	0.	0.
330.	*	0.3	0.1	0.	0.	0.	0.	0.	0.
340.	*	0.3	0.2	0.	0.	0.	0.	0.	0.
350.	*	0.5	0.3	0.1	0.	0.	0.	0.	0.
360.	*	0.5	0.3	0.1	0.	0.	0.	0.	0.
------	*	----------	----------	----------	----------	----------	----------	----------	----------
MAX	*	1.2	1.2	1.1	0.7	0.8	0.9	1.1	1.
DEGR.	*	60	80	80	110	110	110	110	110

THE HIGHEST CONCENTRATION OF 1.30 ppm OCCURRED AT RECEPTOR REC73.

FF

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*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/7/2012 12:23:51 PM
** File: F:\2975 FirstLight\Microscale\Worst\49 Rte 44 & Orchard LOS&ADT\2022NBPM.ou2
**
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: FirstLight-Taunton-Rte 44 & Orchard St- NoBuild PM RUN: CAL3QHC RUN

DATE : 12/ 7/12
TIME : 12:23:49

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE	VPH	EF	H	W	V/C	QUEUE
	*	X1	Y1	X2	Y2	*									
	*	(DEG)	(G/MI)	(M)	(M)		(VEH)								
1. EBTL	*	238118.14	850750.62	238199.34	850742.50	*	82.	96.	AG	1292.	8.5	0.0	13.4		
2. EBTLQ	*	238199.34	850742.50	238137.20	850748.69	*	62.	276.	AG	119.	100.0	0.0	7.4	0.76	10.4
3. EBRL	*	238167.22	850742.50	238197.22	850740.06	*	30.	95.	AG						

385. 8.5 0.0 9.0
4. EBRLQ * 238197.22 850740.06 238160.12 850743.06 * 37. 275. AG
59. 100.0 0.0 3.0 0.45 6.2
5. WBLT * 238300.23 850741.88 238230.86 850748.50 * 70. 275. AG
1623. 8.5 0.0 13.4
6. WBLTQ * 238230.86 850748.50 238810.45 850693.12 * 582. 95. AG
144. 100.0 0.0 7.4 1.22 97.0
7. WBRL * 238299.03 850746.69 238231.45 850754.00 * 68. 276. AG
167. 8.5 0.0 9.4
8. WBRLQ * 238231.45 850754.00 238246.95 850752.31 * 16. 96. AG
57. 100.0 0.0 3.4 0.19 2.6
9. NBLL * 238225.09 850675.19 238217.52 850730.06 * 55. 352. AG
290. 8.5 0.0 9.7
10. NBLLQ * 238217.52 850730.06 238222.67 850692.69 * 38. 172. AG
80. 100.0 0.0 3.7 0.54 6.3
11. NBTR * 238229.05 850675.50 238221.16 850730.06 * 55. 352. AG
166. 8.5 0.0 10.0
12. NBTRQ * 238221.16 850730.06 238224.80 850704.88 * 25. 172. AG
94. 100.0 0.0 4.0 0.53 4.2
13. SBLL * 238200.86 850837.00 238209.34 850762.75 * 75. 173. AG
174. 8.5 0.0 9.7
14. SBLLQ * 238209.34 850762.75 238206.38 850788.69 * 26. 353. AG
92. 100.0 0.0 3.7 0.50 4.3
15. SBTR * 238200.25 850836.69 238204.80 850763.69 * 73. 176. AG
273. 8.5 0.0 9.7
16. SBTRQ * 238204.80 850763.69 238190.62 850991.12 * 228. 356. AG
101. 100.0 0.0 3.7 1.24 38.0
17. EBOUT * 238232.06 850738.25 238299.34 850731.56 * 68. 96. AG
1428. 8.5 0.0 13.4
18. WBOUT * 238198.44 850754.25 238133.30 850759.44 * 65. 275. AG
2006. 8.5 0.0 13.4
19. NBOUT * 238213.58 850762.50 238204.19 850836.12 * 74. 353. AG
371. 8.5 0.0 9.4
20. SBOUT * 238209.64 850730.62 238221.16 850675.50 * 56. 168. AG
565. 8.5 0.0 9.0
21. EBL * 238199.95 850742.50 238213.77 850761.88 * 24. 35. AG
89. 9.4 0.0 9.0
22. EBT * 238199.77 850742.12 238231.58 850738.50 * 32. 97. AG
1203. 8.5 0.0 12.0
23. EBR * 238197.95 850740.06 238209.58 850731.88 * 14. 125. AG

385. 10.3 0.0 9.0
24. WBL * 238229.97 850749.00 238209.77 850732.31 * 26. 230. AG
25. 9.4 0.0 9.0
25. WBT * 238230.06 850748.75 238197.77 850754.25 * 33. 280. AG
1598. 8.5 0.0 12.0
26. WBR * 238230.81 850753.88 238213.69 850760.75 * 18. 292. AG
167. 10.3 0.0 9.0
27. NBL * 238217.69 850731.38 238199.09 850754.06 * 29. 321. AG
290. 9.4 0.0 9.0
28. NBT * 238221.11 850730.94 238214.62 850761.75 * 31. 348. AG
115. 8.5 0.0 9.0
29. NBR * 238221.39 850730.06 238232.73 850737.88 * 14. 55. AG
51. 10.3 0.0 9.0
30. SBL * 238209.11 850762.25 238229.58 850738.81 * 31. 139. AG
174. 9.4 0.0 9.0
31. SBT * 238205.02 850763.12 238209.02 850733.38 * 30. 172. AG
155. 8.5 0.0 9.0
32. SBR * 238204.53 850762.81 238192.25 850754.06 * 15. 235. AG
118. 10.3 0.0 9.0

FF

JOB: FirstLight-Taunton-Rte 44 & Orchard St- NoBuild PM RUN: CAL3QHC
RUN

DATE : 12/ 7/12
TIME : 12:23:49

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. EBTLQ	*	120	58	6.0	1292	1900	45.89	3	3
4. EBRLQ	*	120	58	6.0	385	1900	45.89	3	3
6. WBLTQ	*	120	70	6.0	1623	1900	45.89	3	3
8. WBRLQ	*	120	56	6.0	167	1900	45.89	3	3
10. NBLLQ	*	120	78	6.0	290	1900	45.89	3	3

12. NBTRQ	*	120	92	6.0	166	1900	45.89	3	3
14. SBLLQ	*	120	90	6.0	174	1900	45.89	3	3
16. SBTRQ	*	120	98	6.0	273	1900	45.89	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. R_001	*	238196.62	850836.38	1.8	*
2. R_002	*	238196.92	850831.56	1.8	*
3. R_003	*	238196.62	850826.12	1.8	*
4. R_004	*	238196.92	850820.31	1.8	*
5. R_005	*	238196.92	850814.25	1.8	*
6. R_006	*	238197.52	850809.12	1.8	*
7. R_007	*	238199.05	850801.56	1.8	*
8. R_008	*	238198.44	850795.50	1.8	*
9. R_009	*	238199.95	850788.25	1.8	*
10. R_010	*	238201.45	850782.44	1.8	*
11. R_011	*	238201.77	850776.12	1.8	*
12. R_012	*	238200.25	850770.62	1.8	*
13. R_013	*	238196.92	850764.88	1.8	*
14. R_014	*	238191.77	850762.19	1.8	*
15. R_015	*	238184.80	850761.56	1.8	*
16. R_016	*	238176.62	850761.56	1.8	*
17. R_017	*	238169.66	850762.19	1.8	*
18. R_018	*	238161.77	850763.38	1.8	*
19. R_019	*	238155.41	850764.88	1.8	*
20. R_020	*	238208.12	850837.00	1.8	*
21. R_021	*	238207.22	850832.19	1.8	*
22. R_022	*	238208.44	850824.88	1.8	*
23. R_023	*	238209.34	850820.94	1.8	*
24. R_024	*	238209.95	850814.88	1.8	*
25. R_025	*	238210.55	850807.31	1.8	*
26. R_026	*	238210.86	850800.62	1.8	*
27. R_027	*	238211.77	850794.56	1.8	*

FF

RECEPTOR	COORDINATES (M) X	Y	Z
28. R_028	238212.98	850785.50	1.8
29. R_029	238214.48	850776.69	1.8
30. R_030	238216.61	850768.81	1.8
31. R_031	238220.86	850762.75	1.8
32. R_032	238225.41	850759.12	1.8
33. R_033	238232.38	850757.62	1.8
34. R_034	238239.95	850756.69	1.8
35. R_035	238249.64	850756.44	1.8
36. R_036	238257.22	850755.19	1.8
37. R_037	238266.31	850754.56	1.8
38. R_038	238274.19	850754.25	1.8
39. R_039	238282.38	850754.00	1.8
40. R_040	238289.34	850753.38	1.8
41. R_041	238295.41	850753.38	1.8
42. R_042	238299.64	850752.75	1.8
43. R_043	238299.34	850724.56	1.8
44. R_044	238292.06	850725.50	1.8
45. R_045	238284.19	850726.44	1.8
46. R_046	238275.70	850727.31	1.8
47. R_047	238267.81	850728.25	1.8
48. R_048	238261.16	850729.44	1.8
49. R_049	238254.48	850730.62	1.8
50. R_050	238247.81	850731.56	1.8
51. R_051	238240.55	850731.88	1.8
52. R_052	238234.48	850730.94	1.8
53. R_053	238229.95	850728.25	1.8
54. R_054	238227.52	850725.19	1.8
55. R_055	238226.31	850719.12	1.8
56. R_056	238226.92	850712.19	1.8
57. R_057	238228.44	850700.38	1.8
58. R_058	238229.05	850695.50	1.8
59. R_059	238229.95	850690.06	1.8
60. R_060	238230.55	850685.19	1.8
61. R_061	238231.16	850680.06	1.8
62. R_062	238232.06	850675.50	1.8
63. R_063	238217.52	850675.50	1.8
64. R_064	238216.61	850680.62	1.8

65. R_065	*	238215.09	850687.00	1.8 *
66. R_066	*	238213.89	850695.19	1.8 *
67. R_067	*	238212.98	850704.31	1.8 *
68. R_068	*	238211.45	850710.94	1.8 *
69. R_069	*	238208.73	850719.75	1.8 *
70. R_070	*	238205.70	850726.12	1.8 *
71. R_071	*	238202.06	850731.56	1.8 *
72. R_072	*	238194.80	850734.88	1.8 *
73. R_073	*	238186.92	850736.44	1.8 *
74. R_074	*	238179.95	850737.00	1.8 *
75. R_075	*	238171.77	850736.12	1.8 *
76. R_076	*	238164.50	850735.19	1.8 *
77. R_077	*	238227.22	850707.00	1.8 *
78. R_078	*	238146.92	850739.44	1.8 *
79. R_079	*	238138.44	850740.06	1.8 *

FF

JOB: FirstLight-Taunton-Rte 44 & Orchard St- NoBuild PM RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
80. R_080	*	238132.08	850740.38	1.8 *
81. R_081	*	238126.62	850741.56	1.8 *
82. R_082	*	238121.17	850741.88	1.8 *
83. R_083	*	238117.23	850741.88	1.8 *
84. R_084	*	238117.53	850767.94	1.8 *
85. R_085	*	238122.08	850768.25	1.8 *
86. R_086	*	238127.83	850767.00	1.8 *
87. R_087	*	238131.77	850766.38	1.8 *
88. R_088	*	238135.11	850766.12	1.8 *

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	* 0.4	0.4	0.5	0.5	0.5	0.5	0.7	0.5	0.7	1.1	1.1	0.5	0.4	0.2	0.1	0.1	0.	0.	0.	0.1
10.	* 0.5	0.5	0.5	0.5	0.5	0.6	0.8	0.7	0.8	1.1	1.2	0.9	0.5	0.2	0.2	0.1	0.1	0.1	0.1	0.
20.	* 0.4	0.4	0.5	0.6	0.7	0.7	0.8	0.7	0.8	0.9	1.	0.8	0.6	0.4	0.2	0.1	0.1	0.1	0.1	0.
30.	* 0.4	0.5	0.5	0.7	0.6	0.7	0.7	0.7	0.7	0.9	1.	0.9	0.6	0.5	0.1	0.1	0.1	0.1	0.1	0.
40.	* 0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.6	0.7	0.9	0.9	0.7	0.5	0.5	0.3	0.2	0.2	0.2	0.1	0.
50.	* 0.3	0.4	0.5	0.6	0.5	0.5	0.6	0.5	0.5	0.9	0.9	0.7	0.6	0.5	0.3	0.2	0.2	0.2	0.1	0.
60.	* 0.3	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.8	0.7	0.5	0.2	0.3	0.3	0.2	0.2	0.2	0.
70.	* 0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.7	0.7	0.5	0.2	0.3	0.4	0.4	0.2	0.2	0.
80.	* 0.3	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.8	0.8	0.7	0.5	0.3	0.6	0.7	0.6	0.4	0.3	0.
90.	* 0.3	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.9	0.9	0.8	0.5	0.7	0.8	0.9	0.9	0.9	0.8	0.
100.	* 0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.9	0.9	1.	1.1	0.9	1.	1.3	1.4	1.5	1.3	1.1	0.1
110.	* 0.6	0.7	0.6	0.6	0.6	0.6	0.7	0.8	1.	1.2	1.4	1.4	0.9	1.2	1.3	1.4	1.6	1.5	1.5	0.1
120.	* 0.7	0.7	0.7	0.7	0.8	0.8	0.9	1.	1.2	1.4	1.5	1.1	0.7	1.	1.2	1.3	1.3	1.3	1.3	0.1
130.	* 0.7	0.8	0.8	0.8	0.9	0.9	1.	1.	1.2	1.6	1.3	1.1	0.8	1.1	1.2	1.1	1.2	1.2	1.2	0.1
140.	* 1.	1.	0.9	0.9	0.9	0.9	1.1	1.2	1.3	1.5	1.6	0.9	0.7	1.	1.	1.1	1.1	1.2	1.1	0.2
150.	* 1.	1.	1.	1.	1.2	1.2	1.2	1.4	1.2	1.4	1.1	0.7	0.9	1.2	1.1	1.1	1.2	1.1	1.1	0.2

```
 1.2    1.1    1.1    0.3
 160.  *    0.7    0.8    0.8    0.9    0.9     1.    1.1    0.8     1.    1.2     1.    0.7    0.8     1.     1.    1.1
 1.1     1.    0.9    0.4
 170.  *    0.9    0.9    0.8    0.8    0.6    0.7    0.7    0.6    0.7    0.9    0.9    0.7    0.9    0.8     1.    1.1
 1.     1.    0.9    0.4
 180.  *    0.5    0.5    0.4    0.5    0.5    0.6    0.7    0.6    0.8    0.8    0.8    0.6    0.7    1.1    1.2    1.1
 1.1     1.     1.    0.7
 190.  *    0.5    0.5    0.5    0.5    0.4    0.4    0.5    0.4    0.7    0.7    0.7    0.5    0.8     1.    1.2     1.
 1.1     1.    0.9    0.7
 200.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.6    0.6    0.6    0.9    1.1    1.1     1.
 0.9    0.9    0.9     1.
 210.  *    0.2    0.2    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.5    0.6     1.     1.     1.    1.1
 1.    0.9    0.9    0.9
 220.  *    0.1    0.2    0.2    0.2    0.2    0.3    0.4    0.4    0.4    0.5    0.5    0.8     1.    1.1    1.1     1.
 1.     1.    0.9    0.7

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *     1.     1.     1.     1.    1.2    1.2    1.2    1.4    1.3    1.6    1.6    1.4     1.    1.2    1.3    1.4
 1.6    1.5    1.5     1.
 DEGR. *    140    140    150    150    150    150    150    150    140    130    140    110    210    110    100    100
 110    110    110    200
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

```
WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC1   REC2   REC3   REC4   REC5   REC6   REC7   REC8   REC9   REC10  REC11  REC12  REC13  REC14  REC15  REC16
REC17  REC18  REC19  REC20

 ------*-----------------------------------------------------------------------------------------------------------------
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---------------------
230.  *     0.     0.     0.    0.1    0.2    0.2    0.2    0.4    0.4    0.5    0.6    0.8    0.9    1.1    1.1    1.2
1.2    1.1    0.9    0.4
240.  *     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.4    0.4    0.5    0.7     1.    1.1    1.3    1.3
1.3     1.    0.9    0.4
250.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.5    0.6    0.9    1.2    1.2    1.1
1.1     1.    0.7    0.4
260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.4    0.7    1.1    1.2    1.2
1.    0.8    0.6    0.2
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.4    0.8    0.9    0.9
0.8    0.6    0.4    0.2
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.4    0.5    0.6
0.5    0.4    0.2    0.2
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.3    0.3
0.3    0.2    0.1    0.2
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.2
0.2    0.1    0.1    0.2
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1
0.1    0.1     0.    0.2
320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1
0.1    0.1     0.    0.3
330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2     0.     0.     0.     0.1    0.1
0.1    0.1     0.    0.3
340.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.1    0.2    0.3    0.3    0.2     0.     0.     0.     0.
0.     0.     0.    0.3
350.  *    0.2    0.2    0.2    0.3    0.3    0.3    0.4    0.3    0.4    0.5    0.5    0.4    0.1    0.1     0.     0.
0.     0.     0.    0.3
360.  *    0.4    0.4    0.5    0.5    0.5    0.5    0.7    0.5    0.7    1.1    1.1    0.5    0.4    0.2    0.1    0.1
0.     0.     0.    0.1

------*-------------------------------------------------------------------------------------------------------------------
---------------------
MAX   *     1.     1.     1.     1.    1.2    1.2    1.2    1.4    1.3    1.6    1.6    1.4     1.    1.2    1.3    1.4
1.6    1.5    1.5     1.
DEGR. *    140    140    150    150    150    150    150    150    140    130    140    110    210    110    100    100
110    110    110    200

      MODEL RESULTS
      -------------
```

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
.	* 0.3	0.3	0.2	0.2	0.2	0.4	0.3	0.3	0.3	0.2	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.
10.	* 0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20.	* 0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
40.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MAX	* 0.3	0.3	0.2	0.2	0.2	0.4	0.3	0.3	0.3	0.2	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.
DEGR.	* 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
50.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
60.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
70.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
80.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
90.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.3	0.5	0.6	0.6	0.4	0.5	0.4	0.4	0.2	0.2
100.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.7	1.1	1.2	1.1	0.9	0.9	0.8	0.8	0.6	0.5
110.	*	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.5	0.6	0.9	1.4	1.4	1.4	1.2	1.2	1.	0.9	0.7	0.6
120.	*	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.4	0.5	0.8	1.1	1.1	1.6	1.5	1.3	1.3	1.2	1.1	0.8	0.6
130.	*	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.5	0.7	1.1	1.3	1.5	1.5	1.2	1.2	1.2	1.	0.9	0.6
140.	*	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.6	0.7	0.9	1.1	1.5	1.5	1.2	1.2	1.2	1.1	1.	0.7
150.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.7	0.9	1.3	1.3	1.1	1.1	1.1	1.1	1.	0.7
160.	*	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.4	0.7	0.7	1.1	1.3	0.9	1.	1.	0.9	0.9	0.7
170.	*	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.7	0.7	0.8	1.	1.2	0.9	1.	1.	0.9	0.9	0.9
180.	*	0.7	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.5	0.8	0.9	0.9	0.9	1.2	0.9	0.9	0.9	0.9	0.9	0.9
190.	*	0.8	0.7	0.9	0.9	0.9	1.	0.9	0.8	0.5	0.5	0.8	1.	1.1	1.1	0.9	0.9	0.9	0.9	0.9	0.9

```
200.  *     1.     1.     1.    0.9     1.    1.1    1.2     1.    0.6    0.5    0.6    0.9     1.    1.3    0.9     1.
0.9    0.9    0.9    0.9
210.  *    0.9    0.9    0.8    0.8    0.9     1.    1.1    1.1    0.8    0.7    0.6    0.7    0.8    1.3    1.2     1.
1.    0.9    0.9    0.9
220.  *    0.8    0.7    0.8    0.8    0.9    0.9     1.    1.1    0.9    0.7    0.7    0.7    0.6    1.1    1.5    1.2
1.1    1.1     1.    0.9
230.  *    0.5    0.6    0.6    0.6    0.8    0.9     1.     1.    1.1    0.9    0.8    0.8    0.7     1.    1.1    1.3
1.2    1.1    1.1    1.1
240.  *    0.4    0.4    0.4    0.5    0.5    0.6    0.8     1.    1.1    1.1     1.    0.9    0.8    1.2    1.2    1.3
1.3    1.2    1.2    1.2
250.  *    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.9    1.1    1.1    0.9    1.1    0.9     1.    1.4    1.4
1.3    1.3    1.3    1.2
260.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.7    0.9    0.9    0.8    1.1    1.1    1.1    1.1    1.3
1.3    1.4    1.4    1.4
270.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.6    0.7    0.7    0.8    0.8    0.9    0.7    0.9    1.1
0.9     1.     1.     1.
280.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.6    0.6    0.7    0.5    0.6    0.5    0.4    0.2    0.5
0.5    0.4    0.4    0.4
290.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.6    0.6    0.3    0.4    0.4    0.3    0.3    0.1
0.1     0.     0.     0.
300.  *    0.3    0.4    0.4    0.5    0.5    0.5    0.5    0.6    0.7    0.6    0.4    0.4    0.2    0.2    0.2    0.1
0.1    0.1    0.1    0.1
310.  *    0.4    0.4    0.5    0.5    0.5    0.5    0.5    0.6    0.7    0.7    0.5    0.3    0.3    0.2    0.1    0.1
0.1    0.1    0.1    0.1
320.  *    0.4    0.5    0.5    0.6    0.6    0.5    0.6    0.6    0.8    0.8    0.5    0.3    0.3    0.1    0.1    0.1
0.1    0.1    0.1    0.1
330.  *    0.4    0.4    0.5    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.5    0.4    0.2    0.1    0.1    0.1
0.1    0.1    0.1    0.1
340.  *    0.4    0.4    0.4    0.5    0.7    0.7    0.7    0.7    0.8    0.7    0.4    0.3    0.1    0.1    0.1    0.1
0.1     0.     0.     0.
350.  *    0.4    0.4    0.4    0.5    0.5    0.5    0.4    0.5    0.4    0.4    0.3    0.1    0.1    0.1     0.     0.
0.     0.     0.     0.
360.  *    0.3    0.3    0.2    0.2    0.2    0.4    0.3    0.3    0.3    0.2    0.1    0.1     0.     0.     0.     0.
0.     0.     0.     0.

------*-------------------------------------------------------------------------------------------------------------
--------------------
MAX   *     1.     1.     1.    0.9     1.    1.1    1.2    1.1    1.1    1.1    1.1    1.4    1.6    1.5    1.5    1.4
1.3    1.4    1.4    1.4
DEGR. *    200    200    200    190    200    200    200    210    230    240    120    110    120    120    220    250
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240 260 260 260

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	*	0.	0.	0.6	0.9	0.9	0.9	0.9	1.	1.	1.	1.	0.8	0.7	0.6	0.5	0.5	0.7	0.8	0.8	0.8
10.	*	0.	0.	0.4	0.8	0.9	0.9	0.9	1.	1.	1.	1.	1.	0.7	0.6	0.5	0.5	0.4	0.3	0.3	0.3
20.	*	0.	0.	0.3	0.8	0.9	0.9	0.9	1.	1.	1.	1.	0.9	0.7	0.7	0.5	0.3	0.3	0.3	0.3	0.3
30.	*	0.	0.	0.2	0.6	0.9	0.9	0.9	1.	1.	1.	1.	0.9	0.8	0.6	0.6	0.5	0.3	0.3	0.3	0.3
40.	*	0.	0.	0.3	0.7	0.9	1.	1.	1.	1.	1.	1.	1.	0.8	0.7	0.6	0.6	0.4	0.3	0.3	0.3
50.	*	0.	0.	0.3	0.6	0.8	1.	1.1	1.1	1.1	1.1	1.1	1.	0.9	0.8	0.6	0.6	0.3	0.3	0.3	0.3
60.	*	0.	0.	0.3	0.5	0.8	1.	1.	1.1	1.1	1.2	1.1	1.1	1.	0.7	0.7	0.6	0.3	0.3	0.2	0.2
70.	*	0.	0.	0.3	0.5	0.7	0.9	1.	1.1	1.2	1.2	1.2	1.2	1.	0.8	0.6	0.5	0.3	0.2	0.1	0.1
80.	*	0.1	0.1	0.4	0.6	0.7	0.8	1.	1.1	1.2	1.3	1.3	1.2	0.9	0.7	0.5	0.3	0.2	0.2	0.1	0.1
90.	*	0.2	0.2	0.3	0.4	0.6	0.7	0.7	0.9	1.	1.	1.	0.9	0.7	0.5	0.3	0.2	0.1	0.1	0.1	0.1

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100.  *    0.4    0.4    0.2    0.3    0.4    0.4    0.5    0.6    0.7    0.7    0.7    0.5    0.2    0.2    0.1    0.1
0.     0.     0.     0.
110.  *    0.5    0.5     0.     0.     0.1    0.1    0.2    0.2    0.3    0.3    0.3    0.1     0.     0.     0.     0.
0.     0.     0.     0.
120.  *    0.4    0.4     0.     0.     0.1    0.1    0.1    0.1    0.1    0.2    0.1    0.1     0.     0.     0.     0.
0.     0.     0.     0.
130.  *    0.5    0.4     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
140.  *    0.5    0.4     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
150.  *    0.4    0.3     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
160.  *    0.6    0.4     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
0.     0.     0.     0.
170.  *    0.7    0.5     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2
0.1    0.1    0.1     0.
180.  *    0.8    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.4    0.5    0.4
0.2    0.1    0.1     0.
190.  *    0.9    0.8     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.4    0.6    0.7    0.6
0.3    0.2    0.2     0.
200.  *    0.9    0.8     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3    0.6    0.8    0.9    0.8
0.3    0.3    0.2    0.1
210.  *    0.9    0.9     0.     0.     0.     0.     0.     0.     0.     0.     0.3    0.4    0.5    0.8    0.9    0.8
0.4    0.3    0.3    0.2
220.  *    0.9    0.9     0.     0.     0.     0.     0.     0.     0.1    0.3    0.3    0.4    0.5    0.8    0.8    0.8
0.4    0.3    0.3    0.2
230.  *    1.1    1.1     0.     0.     0.     0.     0.     0.1    0.2    0.4    0.3    0.4    0.5    0.6    0.8    0.7
0.3    0.2    0.2    0.2
240.  *    1.2    1.2     0.     0.     0.     0.     0.1    0.2    0.3    0.3    0.4    0.3    0.5    0.6    0.7    0.7
0.4    0.3    0.2    0.2
250.  *    1.2    1.2    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.4    0.3    0.5    0.5    0.7    0.7
0.4    0.3    0.2    0.2
260.  *    1.3    1.4    0.1    0.1    0.2    0.1    0.2    0.3    0.3    0.5    0.4    0.3    0.4    0.5    0.7    0.7
0.4    0.3    0.2    0.2
270.  *    1.1    1.1    0.3    0.4    0.4    0.6    0.7    0.7    0.7    0.7    0.7    0.5    0.5    0.6    0.7    0.7
0.4    0.4    0.2    0.2
280.  *    0.3    0.3    1.1    1.2    1.2    1.1     1.     1.     1.     1.    1.1    0.7    0.7    0.9    0.9    0.8
0.4    0.4    0.2    0.2
290.  *     0.     0.    1.2    1.2    1.4    1.4    1.2    1.2    1.2    1.2    1.1    1.1     1.     1.    1.1     1.
0.5    0.4    0.3    0.2
```

```
300.  *     0.     0.    1.2    1.1    1.2    1.3    1.1    1.1    1.1     1.     1.     1.    0.9    1.1    1.4    1.3
0.9    0.8    0.7    0.4
310.  *    0.1    0.1    1.1    1.2    1.2    1.2    1.2    1.2    1.1    1.2    0.9    0.7    0.8    0.9    1.2    1.4
0.9    0.8    0.8    0.7
320.  *    0.1    0.1    1.1    1.2    1.2    1.2    1.2    1.2    1.2     1.     1.    0.9    0.7    0.7    1.3    1.4
1.    0.9    0.8    0.7
330.  *     0.     0.     1.    1.1    1.1    1.1    1.1    1.1    1.1     1.     1.    0.8    0.7    0.5    1.2    1.1
1.1    1.2    1.1    0.9
340.  *     0.     0.    0.8    0.9    0.9    0.9     1.     1.    1.1    1.2     1.    0.9    0.6    0.6    0.7    0.9
0.9    0.9    0.9    0.9
350.  *     0.     0.    0.7    0.9    0.9    0.9    0.9     1.     1.    1.1    1.1    0.9    0.6    0.5    0.6    0.6
0.8    0.8    0.7    0.7
360.  *     0.     0.    0.6    0.9    0.9    0.9    0.9     1.     1.     1.     1.    0.8    0.7    0.6    0.5    0.5
0.7    0.8    0.8    0.8

------*-------------------------------------------------------------------------------------------------------------------
----------------------
MAX   *    1.3    1.4    1.2    1.2    1.4    1.4    1.2    1.2    1.2    1.3    1.3    1.2     1.    1.1    1.4    1.4
1.1    1.2    1.1    0.9
DEGR. *    260    260    290    280    290    290    290    290     70     80     80     70     60    300    300    310
330    330    330    330
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

```
WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
REC77  REC78  REC79  REC80

------*-------------------------------------------------------------------------------------------------------------------
----------------------
```

```
    .  *    0.6    0.5    0.9    0.9    0.9    0.7    0.7    0.5     1.    0.9    1.2    1.3    1.4    1.3    1.2     1.
   0.7    0.9    0.8    0.4
  10.  *    0.3    0.3    0.7    0.9    0.9    0.8    0.8    0.6    0.8    0.9    0.9    1.4    1.5    1.4    1.2    1.1
  0.5    0.9    0.9    0.5
  20.  *    0.3    0.3    0.8    0.8    0.9     1.     1.    0.7    0.6    0.7    0.8    1.2    1.5    1.3    1.2    1.1
  0.3     1.     1.    0.8
  30.  *    0.3    0.3    0.6    0.7    0.9    0.9    1.1     1.    0.6    0.7    0.7     1.    1.4    1.4    1.2    1.2
  0.5     1.     1.    0.8
  40.  *    0.3    0.3    0.6    0.6    0.7    0.9     1.     1.    0.8    0.7    0.7    0.8    1.2    1.6    1.2    1.2
  0.5    1.1    1.1    0.9
  50.  *    0.3    0.2    0.6    0.6    0.7    0.9    1.1    1.3     1.    0.7    0.9    0.9    1.3    1.4    1.2    1.2
  0.6    1.3    1.2    1.2
  60.  *    0.1    0.1    0.4    0.5    0.7    0.8    1.1    1.2    1.2    0.8    0.9     1.    1.1    1.4    1.3    1.1
  0.5    1.1    1.2    1.1
  70.  *    0.1    0.1    0.3    0.4    0.4    0.7    0.9    1.1    1.1     1.    1.1    1.2    1.3    1.4    1.4    1.3
  0.4    1.4    1.3    1.1
  80.  *    0.1    0.1    0.3    0.4    0.4    0.6    0.8    0.9     1.    1.2     1.    1.2    1.5    1.5    1.3    1.2
  0.3    1.6    1.5    1.5
  90.  *    0.1    0.1    0.2    0.4    0.4    0.5    0.6    0.7    0.8    0.9    0.8     1.    1.2    1.3    1.1     1.
  0.1    1.4    1.4    1.4
 100.  *     0.     0.    0.1    0.3    0.3    0.4    0.4    0.6    0.6    0.7    0.6    0.6    0.7    0.7    0.5    0.3
 0.1    0.6    0.5    0.5
 110.  *     0.     0.     0.    0.3    0.3    0.4    0.5    0.6    0.5    0.5    0.4    0.5    0.3    0.3     0.     0.
 0.    0.1    0.1    0.1
 120.  *     0.     0.     0.    0.2    0.3    0.3    0.5    0.6    0.6    0.5    0.4    0.4    0.3    0.3    0.1     0.
 0.     0.     0.     0.
 130.  *     0.     0.     0.    0.2    0.3    0.3    0.4    0.5    0.6    0.5    0.5    0.3    0.2    0.2    0.1     0.
 0.     0.     0.     0.
 140.  *     0.     0.     0.    0.1    0.3    0.3    0.4    0.5    0.6    0.5    0.5    0.2    0.1    0.1     0.     0.
 0.     0.     0.     0.
 150.  *     0.     0.     0.    0.1    0.2    0.3    0.5    0.5    0.5    0.5    0.4    0.1    0.1     0.     0.     0.
 0.     0.     0.     0.
 160.  *     0.     0.     0.    0.1    0.2    0.2    0.4    0.4    0.5    0.4    0.2    0.1     0.     0.     0.     0.
 0.1    0.     0.     0.
 170.  *     0.     0.     0.    0.1    0.1    0.2    0.3    0.3    0.3    0.2    0.1     0.     0.     0.     0.     0.
 0.1    0.     0.     0.
 180.  *     0.     0.     0.    0.1    0.1    0.1    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.
 0.2    0.     0.     0.
 190.  *     0.     0.     0.     0.    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.
 0.4    0.     0.     0.
```

```
200.  *     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.     0.     0.     0.     0.     0.     0.
0.5     0.     0.     0.
210.  *     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.     0.     0.     0.     0.     0.
0.6     0.     0.     0.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.6     0.     0.     0.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.6     0.     0.     0.
240.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.6     0.     0.     0.
250.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.7     0.     0.     0.
260.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.
0.7     0.     0.     0.
270.  *    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.4    0.6    0.4    0.1    0.1
0.7    0.1    0.1     0.
280.  *    0.2    0.2     0.     0.     0.     0.     0.     0.     0.1    0.2    0.8    0.9    1.1    0.9    0.4    0.3
0.7    0.2    0.2    0.1
290.  *    0.2    0.2     0.     0.     0.     0.     0.1    0.2    0.4    0.6    1.1    1.4    1.4    1.2    0.7    0.4
1.    0.3    0.3    0.2
300.  *    0.4    0.2     0.     0.     0.1    0.1    0.4    0.3    0.7    0.9    1.2    1.5    1.5    1.5     1.    0.7
1.1    0.5    0.3    0.2
310.  *    0.6    0.6    0.1    0.3    0.3    0.3    0.4    0.6    0.7     1.    1.2    1.5    1.6    1.5    1.1    0.9
1.3    0.7    0.4    0.3
320.  *    0.7    0.6    0.4    0.4    0.4    0.4    0.5    0.6    0.8     1.    1.2    1.5    1.5    1.5    1.2    0.9
1.4    0.7    0.4    0.3
330.  *    0.7    0.7    0.4    0.4    0.4    0.4    0.6    0.5    0.7    0.8     1.    1.2    1.4    1.4    1.1     1.
1.2    0.9    0.4    0.3
340.  *    0.8    0.8    0.5    0.5    0.5    0.5    0.8    0.8    0.8    0.8    0.9    1.1    1.2    1.2    1.1     1.
1.1    0.9    0.5    0.3
350.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.7    0.8    0.9    1.2    1.2    1.2    1.1     1.
0.8    0.9    0.6    0.4
360.  *    0.6    0.5    0.9    0.9    0.9    0.7    0.7    0.5     1.    0.9    1.2    1.3    1.4    1.3    1.2     1.
0.7    0.9    0.8    0.4

------*-----------------------------------------------------------------------------------------------------------------
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MAX   *    0.8    0.8    0.9    0.9    0.9     1.    1.1    1.3    1.2    1.2    1.2    1.5    1.6    1.6    1.4    1.3
1.4    1.6    1.5    1.5
DEGR. *    340    340      0      0      0     20     30     50     60     80      0    300    310     40     70     70
```

320 80 80 80

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88
.	0.3	0.3	0.1	0.	0.	0.	0.	0.
10.	0.4	0.3	0.2	0.	0.	0.	0.	0.
20.	0.6	0.4	0.2	0.	0.	0.	0.1	0.1
30.	0.6	0.5	0.5	0.1	0.1	0.1	0.1	0.1
40.	0.9	0.7	0.5	0.1	0.1	0.1	0.1	0.1
50.	0.9	0.9	0.7	0.1	0.1	0.1	0.1	0.2
60.	1.	0.8	0.8	0.1	0.1	0.1	0.1	0.2
70.	1.2	1.1	1.	0.	0.	0.1	0.2	0.2
80.	1.4	1.4	1.2	0.1	0.1	0.2	0.2	0.2
90.	1.4	1.2	1.1	0.4	0.4	0.6	0.8	0.8
100.	0.5	0.4	0.4	1.1	1.2	1.3	1.4	1.5
110.	0.1	0.1	0.1	0.9	1.	1.3	1.5	1.6
120.	0.	0.	0.	0.8	0.8	1.	1.1	1.2
130.	0.	0.	0.	0.6	0.8	1.	1.1	1.2
140.	0.	0.	0.	0.4	0.5	0.9	1.	1.1
150.	0.	0.	0.	0.2	0.4	0.5	0.8	1.
160.	0.	0.	0.	0.2	0.2	0.4	0.6	0.9
170.	0.	0.	0.	0.2	0.2	0.2	0.5	0.8
180.	0.	0.	0.	0.1	0.2	0.2	0.3	0.8
190.	0.	0.	0.	0.	0.1	0.2	0.2	0.5
200.	0.	0.	0.	0.	0.1	0.2	0.2	0.4
210.	0.	0.	0.	0.	0.	0.1	0.2	0.4
220.	0.	0.	0.	0.	0.	0.1	0.1	0.3

230.	*	0.	0.	0.	0.	0.	0.	0.1	0.2
240.	*	0.	0.	0.	0.	0.	0.	0.	0.2
250.	*	0.	0.	0.	0.	0.	0.	0.	0.1
260.	*	0.	0.	0.	0.	0.	0.	0.	0.
270.	*	0.	0.	0.	0.	0.	0.	0.	0.
280.	*	0.1	0.	0.	0.	0.	0.	0.	0.
290.	*	0.1	0.	0.	0.	0.	0.	0.	0.
300.	*	0.2	0.	0.	0.	0.	0.	0.	0.
310.	*	0.2	0.1	0.	0.	0.	0.	0.	0.
320.	*	0.2	0.1	0.	0.	0.	0.	0.	0.
330.	*	0.3	0.1	0.	0.	0.	0.	0.	0.
340.	*	0.3	0.2	0.	0.	0.	0.	0.	0.
350.	*	0.3	0.2	0.1	0.	0.	0.	0.	0.
360.	*	0.3	0.3	0.1	0.	0.	0.	0.	0.
------	*	----------							
MAX	*	1.4	1.4	1.2	1.1	1.2	1.3	1.5	1.6
DEGR.	*	80	80	80	100	100	100	110	110

THE HIGHEST CONCENTRATION OF 1.60 ppm OCCURRED AT RECEPTOR REC74.

FF

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*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/7/2012 12:36:12 PM
** File: F:\2975 FirstLight\Microscale\Worst\49 Rte 44 & Orchard LOS&ADT\2022NBSA.ou2
**
*********************************************
```

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: FirstLight-Taunton-Rte 44 & Orchard St- NoBuild Saturday RUN: CAL3QHC RUN

DATE : 12/ 7/12
TIME : 12:36:11

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE	VPH	EF	H	W	V/C	QUEUE
	*	X1	Y1	X2	Y2	*	(M)								
	*	(DEG)	(G/MI)	(M)	(M)		(VEH)								
1. EBTL	*	238118.14	850750.62	238199.34	850742.50	*	82.	96.	AG	1305.	8.5	0.0	13.4		
2. EBTLQ	*	238199.34	850742.50	238136.62	850748.75	*	63.	276.	AG	119.	100.0	0.0	7.4	0.76	10.5
3. EBRL	*	238167.22	850742.50	238197.22	850740.06	*	30.	95.	AG						

293. 8.5 0.0 9.0
4. EBRLQ * 238197.22 850740.06 238168.98 850742.38 * 28. 275. AG
59. 100.0 0.0 3.0 0.34 4.7
5. WBLT * 238300.23 850741.88 238230.86 850748.50 * 70. 275. AG
1324. 8.5 0.0 13.4
6. WBLTQ * 238230.86 850748.50 238344.53 850737.62 * 114. 95. AG
144. 100.0 0.0 7.4 1.00 19.0
7. WBRL * 238299.03 850746.69 238231.45 850754.00 * 68. 276. AG
142. 8.5 0.0 9.4
8. WBRLQ * 238231.45 850754.00 238244.62 850752.56 * 13. 96. AG
57. 100.0 0.0 3.4 0.16 2.2
9. NBLL * 238225.09 850675.19 238217.52 850730.06 * 55. 352. AG
307. 8.5 0.0 9.7
10. NBLLQ * 238217.52 850730.06 238223.33 850688.00 * 42. 172. AG
85. 100.0 0.0 3.7 0.67 7.1
11. NBTR * 238229.05 850675.50 238221.16 850730.06 * 55. 352. AG
144. 8.5 0.0 10.0
12. NBTRQ * 238221.16 850730.06 238224.48 850707.00 * 23. 172. AG
100. 100.0 0.0 4.0 0.61 3.9
13. SBLL * 238200.86 850837.00 238209.34 850762.75 * 75. 173. AG
161. 8.5 0.0 9.7
14. SBLLQ * 238209.34 850762.75 238206.45 850788.06 * 25. 353. AG
97. 100.0 0.0 3.7 0.60 4.2
15. SBTR * 238200.25 850836.69 238204.80 850763.69 * 73. 176. AG
218. 8.5 0.0 9.7
16. SBTRQ * 238204.80 850763.69 238186.61 851055.75 * 293. 356. AG
106. 100.0 0.0 3.7 1.54 48.8
17. EBOUT * 238232.06 850738.25 238299.34 850731.56 * 68. 96. AG
1445. 8.5 0.0 13.4
18. WBOUT * 238198.44 850754.25 238133.30 850759.44 * 65. 275. AG
1747. 8.5 0.0 13.4
19. NBOUT * 238213.58 850762.50 238204.19 850836.12 * 74. 353. AG
307. 8.5 0.0 9.4
20. SBOUT * 238209.64 850730.62 238221.16 850675.50 * 56. 168. AG
395. 8.5 0.0 9.0
21. EBL * 238199.95 850742.50 238213.77 850761.88 * 24. 35. AG
76. 9.4 0.0 9.0
22. EBT * 238199.77 850742.12 238231.58 850738.50 * 32. 97. AG
1229. 8.5 0.0 12.0
23. EBR * 238197.95 850740.06 238209.58 850731.88 * 14. 125. AG

293. 10.3 0.0 9.0
24. WBL * 238229.97 850749.00 238209.77 850732.31 * 26. 230. AG
24. 9.4 0.0 9.0
25. WBT * 238230.06 850748.75 238197.77 850754.25 * 33. 280. AG
1300. 8.5 0.0 12.0
26. WBR * 238230.81 850753.88 238213.69 850760.75 * 18. 292. AG
142. 10.3 0.0 9.0
27. NBL * 238217.69 850731.38 238199.09 850754.06 * 29. 321. AG
307. 9.4 0.0 9.0
28. NBT * 238221.11 850730.94 238214.62 850761.75 * 31. 348. AG
89. 8.5 0.0 9.0
29. NBR * 238221.39 850730.06 238232.73 850737.88 * 14. 55. AG
55. 10.3 0.0 9.0
30. SBL * 238209.11 850762.25 238229.58 850738.81 * 31. 139. AG
161. 9.4 0.0 9.0
31. SBT * 238205.02 850763.12 238209.02 850733.38 * 30. 172. AG
78. 8.5 0.0 9.0
32. SBR * 238204.53 850762.81 238192.25 850754.06 * 15. 235. AG
140. 10.3 0.0 9.0

FF

JOB: FirstLight-Taunton-Rte 44 & Orchard St- NoBuild Saturday RUN: CAL3QHC
RUN

DATE : 12/ 7/12
TIME : 12:36:11

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. EBTLQ	*	120	58	6.0	1305	1900	45.89	3	3
4. EBRLQ	*	120	58	6.0	293	1900	45.89	3	3
6. WBLTQ	*	120	70	6.0	1324	1900	45.89	3	3
8. WBRLQ	*	120	56	6.0	142	1900	45.89	3	3
10. NBLLQ	*	120	83	6.0	307	1900	45.89	3	3

12. NBTRQ	*	120	97	6.0	144	1900	45.89	3	3
14. SBLLQ	*	120	95	6.0	161	1900	45.89	3	3
16. SBTRQ	*	120	103	6.0	218	1900	45.89	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. R_001	*	238196.62	850836.38	1.8	*
2. R_002	*	238196.92	850831.56	1.8	*
3. R_003	*	238196.62	850826.12	1.8	*
4. R_004	*	238196.92	850820.31	1.8	*
5. R_005	*	238196.92	850814.25	1.8	*
6. R_006	*	238197.52	850809.12	1.8	*
7. R_007	*	238199.05	850801.56	1.8	*
8. R_008	*	238198.44	850795.50	1.8	*
9. R_009	*	238199.95	850788.25	1.8	*
10. R_010	*	238201.45	850782.44	1.8	*
11. R_011	*	238201.77	850776.12	1.8	*
12. R_012	*	238200.25	850770.62	1.8	*
13. R_013	*	238196.92	850764.88	1.8	*
14. R_014	*	238191.77	850762.19	1.8	*
15. R_015	*	238184.80	850761.56	1.8	*
16. R_016	*	238176.62	850761.56	1.8	*
17. R_017	*	238169.66	850762.19	1.8	*
18. R_018	*	238161.77	850763.38	1.8	*
19. R_019	*	238155.41	850764.88	1.8	*
20. R_020	*	238208.12	850837.00	1.8	*
21. R_021	*	238207.22	850832.19	1.8	*
22. R_022	*	238208.44	850824.88	1.8	*
23. R_023	*	238209.34	850820.94	1.8	*
24. R_024	*	238209.95	850814.88	1.8	*
25. R_025	*	238210.55	850807.31	1.8	*
26. R_026	*	238210.86	850800.62	1.8	*
27. R_027	*	238211.77	850794.56	1.8	*

FF

RECEPTOR	COORDINATES (M) X	Y	Z
28. R_028	238212.98	850785.50	1.8
29. R_029	238214.48	850776.69	1.8
30. R_030	238216.61	850768.81	1.8
31. R_031	238220.86	850762.75	1.8
32. R_032	238225.41	850759.12	1.8
33. R_033	238232.38	850757.62	1.8
34. R_034	238239.95	850756.69	1.8
35. R_035	238249.64	850756.44	1.8
36. R_036	238257.22	850755.19	1.8
37. R_037	238266.31	850754.56	1.8
38. R_038	238274.19	850754.25	1.8
39. R_039	238282.38	850754.00	1.8
40. R_040	238289.34	850753.38	1.8
41. R_041	238295.41	850753.38	1.8
42. R_042	238299.64	850752.75	1.8
43. R_043	238299.34	850724.56	1.8
44. R_044	238292.06	850725.50	1.8
45. R_045	238284.19	850726.44	1.8
46. R_046	238275.70	850727.31	1.8
47. R_047	238267.81	850728.25	1.8
48. R_048	238261.16	850729.44	1.8
49. R_049	238254.48	850730.62	1.8
50. R_050	238247.81	850731.56	1.8
51. R_051	238240.55	850731.88	1.8
52. R_052	238234.48	850730.94	1.8
53. R_053	238229.95	850728.25	1.8
54. R_054	238227.52	850725.19	1.8
55. R_055	238226.31	850719.12	1.8
56. R_056	238226.92	850712.19	1.8
57. R_057	238228.44	850700.38	1.8
58. R_058	238229.05	850695.50	1.8
59. R_059	238229.95	850690.06	1.8
60. R_060	238230.55	850685.19	1.8
61. R_061	238231.16	850680.06	1.8
62. R_062	238232.06	850675.50	1.8
63. R_063	238217.52	850675.50	1.8
64. R_064	238216.61	850680.62	1.8

65. R_065	*	238215.09	850687.00	1.8	*
66. R_066	*	238213.89	850695.19	1.8	*
67. R_067	*	238212.98	850704.31	1.8	*
68. R_068	*	238211.45	850710.94	1.8	*
69. R_069	*	238208.73	850719.75	1.8	*
70. R_070	*	238205.70	850726.12	1.8	*
71. R_071	*	238202.06	850731.56	1.8	*
72. R_072	*	238194.80	850734.88	1.8	*
73. R_073	*	238186.92	850736.44	1.8	*
74. R_074	*	238179.95	850737.00	1.8	*
75. R_075	*	238171.77	850736.12	1.8	*
76. R_076	*	238164.50	850735.19	1.8	*
77. R_077	*	238227.22	850707.00	1.8	*
78. R_078	*	238146.92	850739.44	1.8	*
79. R_079	*	238138.44	850740.06	1.8	*

FF

JOB: FirstLight-Taunton-Rte 44 & Orchard St- NoBuild Saturday RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
80. R_080	*	238132.08	850740.38	1.8	*
81. R_081	*	238126.62	850741.56	1.8	*
82. R_082	*	238121.17	850741.88	1.8	*
83. R_083	*	238117.23	850741.88	1.8	*
84. R_084	*	238117.53	850767.94	1.8	*
85. R_085	*	238122.08	850768.25	1.8	*
86. R_086	*	238127.83	850767.00	1.8	*
87. R_087	*	238131.77	850766.38	1.8	*
88. R_088	*	238135.11	850766.12	1.8	*

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
	* REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
REC17	REC18	REC19	REC20													
.	* 0.5	0.5	0.4	0.5	0.5	0.5	0.6	0.5	0.6	1.1	1.	0.6	0.3	0.2	0.1	0.1
0.1	0.	0.	0.2													
10.	* 0.5	0.5	0.6	0.6	0.6	0.6	0.9	0.8	0.9	1.1	1.2	0.9	0.4	0.2	0.2	0.1
0.1	0.1	0.1	0.1													
20.	* 0.5	0.5	0.5	0.5	0.6	0.7	0.8	0.7	0.8	1.	1.	0.9	0.6	0.2	0.2	0.1
0.1	0.1	0.1	0.													
30.	* 0.4	0.4	0.5	0.7	0.7	0.7	0.8	0.7	0.8	1.	1.	0.8	0.6	0.3	0.2	0.1
0.1	0.1	0.1	0.													
40.	* 0.4	0.5	0.5	0.7	0.5	0.5	0.7	0.6	0.7	0.9	1.	0.8	0.7	0.3	0.2	0.2
0.2	0.1	0.1	0.													
50.	* 0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.8	0.8	0.7	0.6	0.3	0.3	0.2
0.2	0.2	0.1	0.													
60.	* 0.3	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.8	0.7	0.5	0.3	0.3	0.3
0.3	0.2	0.1	0.													
70.	* 0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.8	0.7	0.3	0.2	0.3	0.3
0.3	0.2	0.2	0.													
80.	* 0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.8	0.8	0.7	0.3	0.2	0.3	0.4
0.5	0.4	0.2	0.													
90.	* 0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.8	0.8	0.8	0.4	0.6	0.6	0.7
0.7	0.7	0.6	0.													
100.	* 0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.9	1.	1.	0.7	0.8	1.	1.2
1.2	1.1	0.9	0.													
110.	* 0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.9	1.1	1.2	1.1	0.8	1.	1.2	1.2
1.3	1.4	1.4	0.													
120.	* 0.5	0.6	0.7	0.6	0.6	0.7	0.8	0.9	1.2	1.3	1.3	1.1	0.7	0.9	1.2	1.1
1.2	1.2	1.2	0.													
130.	* 0.8	0.8	0.8	0.9	0.9	0.9	1.	0.9	1.2	1.4	1.3	1.1	0.6	1.	1.	1.
1.1	1.1	1.1	0.1													
140.	* 1.	1.	1.	1.	1.	1.	1.1	1.2	1.4	1.5	1.3	0.9	0.6	0.8	1.	1.1
1.1	1.1	1.	0.2													
150.	* 1.1	1.1	1.	1.	1.1	1.2	1.3	1.3	1.3	1.3	1.1	0.6	0.9	1.	1.	1.

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 1.     1.    0.9    0.3
 160.  *    0.8    0.8    0.9    0.9    0.9     1.    1.2    0.9    0.9    1.1    1.1    0.6    0.6    0.9     1.     1.
 1.    0.9    0.9    0.4
 170.  *    0.7    0.8    0.9    0.7    0.7    0.7    0.8    0.7    0.7    0.9    0.8    0.4    0.8    0.7     1.     1.
 1.    0.9    0.8    0.2
 180.  *    0.6    0.6    0.4    0.4    0.4    0.5    0.7    0.6    0.8    0.8    0.8    0.6    0.7     1.     1.     1.
 0.9    0.9    0.9    0.4
 190.  *    0.5    0.5    0.4    0.4    0.4    0.4    0.5    0.3    0.5    0.7    0.6    0.5    0.7     1.     1.     1.
 0.9    0.9    0.9    0.8
 200.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.5    0.5    0.7    0.9    0.9     1.    0.9
 0.9    0.9    0.8    0.9
 210.  *    0.2    0.2    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.6    0.9     1.    0.9    0.9
 0.9    0.9    0.9    0.9
 220.  *    0.1    0.2    0.2    0.2    0.3    0.3    0.4    0.4    0.4    0.4    0.6    0.7    0.8    0.9    0.9    0.9
 0.9    0.9    0.9    0.7

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 MAX   *    1.1    1.1     1.     1.    1.1    1.2    1.3    1.3    1.4    1.5    1.3    1.1    0.9     1.    1.2    1.2
 1.3    1.4    1.4    0.9
 DEGR. *    150    150    140    140    150    150    150    150    140    140    120    110    150    110    110    100
 110    110    110    200
FF                                                                                                          PAGE    5

      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC1   REC2   REC3   REC4   REC5   REC6   REC7   REC8   REC9   REC10  REC11  REC12  REC13  REC14  REC15  REC16
 REC17  REC18  REC19  REC20

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230.  *     0.     0.     0.    0.1    0.2    0.2    0.2    0.4    0.4    0.4    0.6    0.7    0.9    0.9     1.    1.1
1.1     1.    0.8    0.4
240.  *     0.     0.     0.     0.     0.     0.     0.2    0.2    0.4    0.4    0.5    0.7    0.9     1.    1.2    1.2
1.2    0.9    0.9    0.4
250.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.4    0.6    0.8    1.1    1.1    1.1
1.    0.9    0.6    0.3
260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.7     1.    1.1    1.1
0.9    0.7    0.6    0.2
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.4    0.7    0.8    0.8
0.7    0.5    0.4    0.2
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.4    0.5
0.5    0.4    0.2    0.2
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3
0.3    0.2    0.1    0.2
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1
0.1    0.1    0.1    0.2
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1
0.1    0.1     0.    0.2
320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1
0.1    0.1     0.    0.3
330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1     0.     0.     0.     0.     0.1
0.1     0.     0.    0.3
340.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.3    0.1     0.     0.     0.     0.
0.     0.     0.    0.3
350.  *    0.3    0.3    0.3    0.3    0.2    0.4    0.4    0.4    0.4    0.6    0.6    0.4    0.2    0.1     0.     0.     0.
0.     0.     0.    0.3
360.  *    0.5    0.5    0.4    0.5    0.5    0.5    0.6    0.5    0.6    1.1     1.    0.6    0.3    0.2    0.1    0.1    0.1
0.1     0.     0.    0.2

------*-----------------------------------------------------------------------------------------------------------------
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MAX   *    1.1    1.1     1.     1.    1.1    1.2    1.3    1.3    1.4    1.5    1.3    1.1    0.9    1.1    1.2    1.2
1.3    1.4    1.4    0.9
DEGR. *    150    150    140    140    150    150    150    150    140    140    120    110    150    250    110    100
110    110    110    200

      MODEL RESULTS
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REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
.	*	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.
10.	*	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20.	*	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
40.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MAX	*	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.
DEGR.	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

FF PAGE 6

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
50.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
60.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
70.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
80.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.3	0.4	0.4	0.2	0.2	0.2	0.1	0.1	0.1
100.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.3	0.5	0.8	0.9	0.8	0.6	0.6	0.6	0.4	0.3	0.2
110.	*	0.	0.	0.	0.	0.	0.1	0.1	0.2	0.4	0.5	0.8	1.2	1.3	1.1	1.	1.	0.9	0.7	0.4	0.4
120.	*	0.	0.	0.1	0.1	0.1	0.2	0.2	0.4	0.5	0.7	0.9	1.1	1.5	1.4	1.1	1.2	1.	0.9	0.6	0.5
130.	*	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.4	0.5	0.6	0.9	1.1	1.4	1.3	1.1	1.1	1.1	1.	0.8	0.6
140.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.6	0.8	0.9	1.3	1.2	1.1	1.1	1.1	1.	0.8	0.6
150.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.7	0.8	1.1	1.2	0.9	1.	0.9	0.9	0.8	0.7
160.	*	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.6	0.7	1.	1.1	0.8	0.9	0.9	0.8	0.8	0.7
170.	*	0.3	0.4	0.4	0.4	0.5	0.5	0.4	0.3	0.5	0.5	0.6	0.6	1.	1.1	0.8	0.9	0.8	0.8	0.8	0.8
180.	*	0.7	0.7	0.5	0.6	0.6	0.7	0.7	0.4	0.5	0.5	0.7	0.7	0.8	1.1	0.8	0.8	0.8	0.8	0.8	0.8
190.	*	0.8	0.9	0.8	0.8	0.9	0.9	0.8	0.6	0.5	0.4	0.6	0.7	1.	1.	0.8	0.8	0.8	0.8	0.8	0.8

```
200.  *    0.9    0.9    0.9    0.9    0.9    0.9    1.1    0.9    0.6    0.4    0.6    0.6    0.9    1.2    0.8    0.8
0.8    0.8    0.8    0.8
210.  *    0.9    0.9    0.9    0.9    0.9    0.9     1.    1.1    0.8    0.6    0.6    0.5    0.5    1.2     1.    0.9
0.9    0.8    0.8    0.8
220.  *    0.8    0.8    0.7    0.7    0.8    0.9     1.    1.2    0.8    0.7    0.6    0.5    0.5     1.    1.1     1.
0.9    0.9    0.8    0.8
230.  *    0.5    0.5    0.6    0.6    0.7    0.7    0.9     1.    0.9    0.8    0.7    0.7    0.5     1.    0.9    1.1
1.     1.     1.     1.
240.  *    0.4    0.4    0.4    0.4    0.5    0.6    0.7    0.9     1.     1.    0.8    0.8    0.8     1.    1.1    1.1
1.2    1.1    1.1    1.1
250.  *    0.4    0.4    0.4    0.4    0.4    0.5    0.4    0.7    0.9     1.    0.8     1.    0.9     1.    1.1    1.3
1.2    1.1    1.2    1.1
260.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.6    0.8    0.9    0.7    1.1     1.    1.1    1.1    1.2
1.2    1.3    1.3    1.4
270.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.5    0.6    0.7    0.7    0.8    0.7    0.6    0.8    0.9
0.9    0.9    0.9    0.9
280.  *    0.4    0.4    0.4    0.3    0.3    0.4    0.3    0.5    0.5    0.6    0.4    0.6    0.5    0.4    0.2    0.4
0.4    0.4    0.3    0.3
290.  *    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.3    0.4    0.4    0.3    0.2    0.1
0.1    0.1     0.     0.
300.  *    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.4    0.2    0.2    0.2    0.2    0.1
0.1    0.1    0.1    0.1
310.  *    0.4    0.5    0.4    0.4    0.5    0.5    0.5    0.5    0.7    0.5    0.5    0.3    0.2    0.2    0.1    0.1
0.1    0.1    0.1    0.1
320.  *    0.4    0.4    0.5    0.6    0.6    0.6    0.5    0.5    0.7    0.7    0.5    0.4    0.3    0.1    0.1    0.1
0.1    0.1    0.1    0.1
330.  *    0.4    0.4    0.4    0.5    0.6    0.6    0.6    0.7    0.8    0.8    0.4    0.4    0.2    0.1    0.1    0.1
0.1    0.1    0.1    0.1
340.  *    0.4    0.4    0.4    0.4    0.6    0.7    0.7    0.7    0.8    0.7    0.4    0.3    0.1    0.1    0.1    0.1
0.1    0.1     0.     0.
350.  *    0.3    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.5    0.4    0.3    0.1    0.1    0.1    0.1     0.
0.     0.     0.     0.
360.  *    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.1    0.1     0.     0.     0.     0.
0.     0.     0.     0.

------*-----------------------------------------------------------------------------------------------------------
--------------------
MAX   *    0.9    0.9    0.9    0.9    0.9    0.9    1.1    1.2     1.     1.    0.9    1.2    1.5    1.4    1.1    1.3
1.2    1.3    1.3    1.4
DEGR. *    200    190    200    200    190    190    200    220    240    240    120    110    120    120    120    250
```

240 260 260 260

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	* 0.	0.	0.5	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.8	0.8	0.7	0.6	0.4	0.4	0.7	0.7	0.6	0.6
10.	* 0.	0.	0.4	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.8	0.6	0.6	0.5	0.4	0.3	0.3	0.3	0.3
20.	* 0.	0.	0.3	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.8	0.7	0.7	0.4	0.3	0.3	0.3	0.3	0.3
30.	* 0.	0.	0.2	0.7	0.8	0.8	0.8	0.9	1.	1.	1.	0.8	0.7	0.7	0.5	0.4	0.3	0.3	0.3	0.3
40.	* 0.	0.	0.2	0.7	0.9	0.9	0.9	1.	1.	1.	1.	0.9	0.7	0.7	0.6	0.5	0.4	0.3	0.3	0.3
50.	* 0.	0.	0.3	0.6	0.8	1.	1.	1.1	1.1	1.1	1.1	1.1	0.8	0.7	0.6	0.5	0.3	0.3	0.3	0.3
60.	* 0.	0.	0.2	0.5	0.8	0.9	1.	1.	1.2	1.2	1.2	1.1	0.9	0.7	0.7	0.5	0.3	0.3	0.2	0.2
70.	* 0.	0.	0.2	0.4	0.6	0.9	0.9	1.1	1.1	1.2	1.2	1.1	0.9	0.7	0.5	0.4	0.2	0.2	0.1	0.
80.	* 0.	0.	0.1	0.3	0.5	0.6	0.8	0.9	1.	1.2	1.2	1.1	0.7	0.6	0.4	0.2	0.	0.	0.	0.
90.	* 0.1	0.	0.	0.2	0.4	0.5	0.5	0.6	0.9	1.	0.9	0.8	0.5	0.3	0.2	0.	0.	0.	0.	0.

```
100.  *    0.2    0.1     0.     0.1    0.2    0.2    0.3    0.4    0.6    0.6    0.6    0.4    0.1    0.1     0.     0.
0.     0.     0.     0.
110.  *    0.3    0.3     0.     0.     0.1    0.1    0.2    0.2    0.3    0.3    0.3    0.2     0.     0.     0.     0.
0.     0.     0.     0.
120.  *    0.4    0.4     0.     0.     0.1    0.1    0.1    0.1    0.1    0.2    0.1    0.1     0.     0.     0.     0.
0.     0.     0.     0.
130.  *    0.4    0.4     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
140.  *    0.5    0.4     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
150.  *    0.4    0.3     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
160.  *    0.6    0.4     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
170.  *    0.6    0.5     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.1
0.1    0.1     0.     0.
180.  *    0.8    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.4    0.5    0.4
0.2    0.1     0.     0.
190.  *    0.8    0.7     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.6    0.8    0.6
0.3    0.2    0.2     0.
200.  *    0.8    0.8     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.5    0.8    0.8    0.7
0.4    0.2    0.2     0.
210.  *    0.8    0.8     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.3    0.6    0.8    0.9    0.8
0.5    0.4    0.2    0.1
220.  *    0.8    0.8     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.5    0.6    0.7    0.8    0.7
0.4    0.3    0.2    0.1
230.  *    0.9    0.9     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.2    0.3    0.5    0.7    0.7    0.7
0.4    0.4    0.2    0.2
240.  *     1.     1.     0.     0.     0.     0.1    0.1    0.2    0.3    0.3    0.3    0.3    0.5    0.7    0.7    0.7
0.4    0.4    0.2    0.2
250.  *    1.1    1.1    0.1    0.1    0.1    0.1    0.2    0.3    0.3    0.3    0.3    0.2    0.5    0.7    0.7    0.7
0.4    0.4    0.3    0.2
260.  *    1.1    1.1    0.1    0.1    0.2    0.1    0.2    0.4    0.4    0.5    0.4    0.2    0.4    0.7    0.7    0.7
0.4    0.4    0.3    0.2
270.  *    0.9     1.    0.3    0.4    0.4    0.6    0.6    0.6    0.7    0.7    0.7    0.4    0.5    0.7    0.7    0.7
0.4    0.4    0.4    0.2
280.  *    0.3    0.3    1.1    1.1    1.2    1.1     1.     1.     1.     1.     1.     0.7    0.7    0.8    0.9    0.8
0.4    0.4    0.4    0.2
290.  *     0.     0.    1.2    1.2    1.4    1.3    1.2    1.2    1.2    1.1    1.1    1.1     1.     1.    1.1     1.
0.5    0.4    0.4    0.3
```

```
 300.  *    0.1    0.1    1.1     1.     1.    1.1    1.2     1.     1.    1.1     1.     1.    0.9    1.1    1.2    1.2
 0.7    0.7    0.7    0.4
 310.  *    0.1    0.1    1.2    1.2    1.2    1.1     1.    1.1    1.1     1.    0.8    0.7    0.7    0.9    1.2    1.3
 0.8    0.7    0.7    0.7
 320.  *    0.1    0.1    1.1    1.2    1.2    1.2    1.1    1.1     1.     1.    1.1    0.7    0.7    0.6    1.3    1.3
 0.9    0.9    0.8    0.8
 330.  *    0.1    0.1     1.     1.     1.     1.     1.    1.1    1.1    0.9    0.9    0.8    0.7    0.6     1.    1.1
 0.9    1.1     1.    0.9
 340.  *     0.     0.    0.7    0.8    0.9    0.9    0.9    0.9     1.     1.     1.    0.8    0.7    0.6    0.6     1.
 1.    0.9    0.8    0.8
 350.  *     0.     0.    0.7    0.8    0.8    0.8    0.8    0.9     1.     1.    0.9    0.8    0.4    0.5    0.5    0.6
 0.7    0.8    0.7    0.7
 360.  *     0.     0.    0.5    0.8    0.8    0.8    0.8    0.8    0.9    0.9    0.8    0.8    0.7    0.6    0.4    0.4
 0.7    0.7    0.6    0.6

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.1    1.1    1.2    1.2    1.4    1.3    1.2    1.2    1.2    1.2    1.2    1.1     1.    1.1    1.3    1.3
 1.    1.1     1.    0.9
 DEGR. *    250    250    290    290    290    290    290    290     60     60     60     50    290    300    320    310
 340    330    330    330
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
 REC77  REC78  REC79  REC80

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
```

```
    .  *    0.6    0.6    0.8    0.8    0.8    0.6    0.6    0.5    0.8    0.8    1.1    1.3    1.4    1.4    1.2     1.
   0.6    0.9    0.7    0.4
  10.  *    0.3    0.3    0.6    0.7    0.8    0.8    0.8    0.6    0.6    0.8     1.    1.3    1.5    1.4    1.2     1.
  0.5     1.     1.    0.5
  20.  *    0.3    0.3    0.7    0.9    0.9     1.    0.9    0.7    0.4    0.6    0.8    1.1    1.3    1.3    1.2     1.
  0.3     1.     1.    0.7
  30.  *    0.3    0.3    0.6    0.7    0.8    0.8     1.    0.9    0.4    0.7    0.7     1.    1.4    1.4    1.2    1.2
  0.4     1.     1.    0.9
  40.  *    0.3    0.3    0.5    0.6    0.7    0.8    0.9    0.9    0.8    0.7    0.7    0.8    1.2    1.5    1.2    1.2
  0.4    1.1    1.1     1.
  50.  *    0.2    0.2    0.5    0.6    0.7    0.8     1.    1.1    0.9    0.8    0.9    0.9    1.3    1.4    1.2    1.1
  0.5    1.2    1.1    1.1
  60.  *    0.1    0.1    0.3    0.4    0.6    0.7    0.9    1.1    1.1    0.8    0.9     1.    1.1    1.4    1.2    1.1
  0.4    1.1    1.1     1.
  70.  *     0.     0.    0.2    0.2    0.4    0.6    0.8     1.    0.9    0.9    1.1    1.1    1.3    1.5    1.3    1.3
  0.3    1.2    1.2    1.2
  80.  *     0.     0.    0.2    0.2    0.3    0.4    0.7    0.8    0.8    0.9     1.    1.2    1.3    1.4    1.2    1.1
  0.2    1.4    1.4    1.4
  90.  *     0.     0.    0.1    0.2    0.3    0.4    0.4    0.5    0.8    0.8    0.7    0.8    1.1    1.1    0.9    0.7
  0.    1.3    1.2    1.2
 100.  *     0.     0.     0.    0.2    0.2    0.4    0.4    0.5    0.4    0.5    0.6    0.6    0.6    0.6    0.4    0.3
 0.    0.5    0.5    0.5
 110.  *     0.     0.     0.    0.2    0.2    0.4    0.4    0.5    0.5    0.4    0.4    0.4    0.4    0.3    0.1     0.
 0.    0.1    0.1    0.1
 120.  *     0.     0.     0.    0.1    0.2    0.3    0.4    0.4    0.5    0.4    0.3    0.3    0.2    0.1    0.1     0.
 0.     0.     0.     0.
 130.  *     0.     0.     0.    0.1    0.2    0.4    0.4    0.4    0.6    0.5    0.4    0.3    0.2    0.1     0.     0.
 0.     0.     0.     0.
 140.  *     0.     0.     0.    0.1    0.2    0.3    0.5    0.5    0.5    0.5    0.4    0.2    0.2     0.     0.     0.
 0.     0.     0.     0.
 150.  *     0.     0.     0.    0.1    0.1    0.3    0.4    0.4    0.4    0.4    0.3    0.2     0.     0.     0.     0.
 0.     0.     0.     0.
 160.  *     0.     0.     0.    0.1    0.1    0.2    0.4    0.4    0.4    0.3    0.2     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 170.  *     0.     0.     0.    0.1    0.1    0.1    0.2    0.2    0.2    0.1    0.1     0.     0.     0.     0.     0.
 0.1    0.     0.     0.
 180.  *     0.     0.     0.    0.1    0.1    0.1    0.1    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.
 0.3    0.     0.     0.
 190.  *     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.
 0.4    0.     0.     0.
```

```
200.  *     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.     0.     0.     0.     0.     0.
0.5     0.     0.     0.
210.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.5     0.     0.     0.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.4     0.     0.     0.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.4     0.     0.     0.
240.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.4     0.     0.     0.
250.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.4     0.     0.     0.
260.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.
0.5     0.     0.     0.
270.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.3    0.5    0.3    0.1    0.1
0.6    0.1    0.1     0.
280.  *    0.2    0.2     0.     0.     0.     0.     0.     0.     0.1    0.2    0.7    0.9    1.1    0.8    0.4    0.3
0.6    0.2    0.2    0.1
290.  *    0.2    0.2     0.     0.     0.     0.     0.1    0.2    0.4    0.5    1.1    1.3    1.3    1.2    0.7    0.4
0.9    0.3    0.3    0.2
300.  *    0.3    0.2     0.     0.     0.1    0.1    0.3    0.3    0.5    0.8    1.2    1.5    1.5    1.3    0.9    0.7
1.    0.5    0.3    0.2
310.  *    0.7    0.5    0.1    0.3    0.3    0.3    0.3    0.5    0.7    0.8    1.2    1.4    1.5    1.5    0.9    0.9
1.1    0.7    0.4    0.3
320.  *    0.7    0.7    0.3    0.3    0.3    0.3    0.4    0.6    0.7    0.7    1.2    1.4    1.4    1.4     1.    0.8
1.4    0.8    0.4    0.3
330.  *    0.8    0.7    0.4    0.4    0.4    0.4    0.4    0.4    0.6    0.8    0.9    1.2    1.4    1.4    1.1    0.9
1.2    0.9    0.6    0.3
340.  *    0.9    0.8    0.4    0.4    0.5    0.5    0.7    0.7    0.8    0.7     1.    1.1    1.2    1.2    1.1    0.9
1.1    0.8    0.5    0.3
350.  *    0.7    0.7    0.5    0.6    0.6    0.5    0.5    0.5    0.7    0.8    0.9    1.2    1.3    1.2    1.1    0.9
0.8    0.9    0.7    0.4
360.  *    0.6    0.6    0.8    0.8    0.8    0.6    0.6    0.5    0.8    0.8    1.1    1.3    1.4    1.4    1.2     1.
0.6    0.9    0.7    0.4

------*-------------------------------------------------------------------------------------------------------------
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MAX   *    0.9    0.8    0.8    0.9    0.9     1.     1.    1.1    1.1    0.9    1.2    1.5    1.5    1.5    1.3    1.3
1.4    1.4    1.4    1.4
DEGR. *    340    340      0     20     20     20     30     50     60     70    300    300     10     40     70     70
```

320 80 80 80

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88
.	0.3	0.3	0.1	0.	0.	0.	0.	0.
10.	0.4	0.3	0.2	0.	0.	0.	0.	0.
20.	0.5	0.5	0.3	0.1	0.1	0.1	0.1	0.1
30.	0.6	0.5	0.5	0.1	0.1	0.1	0.1	0.1
40.	0.9	0.7	0.5	0.1	0.1	0.1	0.1	0.1
50.	0.9	0.9	0.7	0.1	0.1	0.1	0.1	0.1
60.	0.9	0.8	0.8	0.1	0.1	0.1	0.1	0.2
70.	1.1	1.	1.	0.	0.1	0.1	0.2	0.2
80.	1.3	1.1	1.1	0.1	0.1	0.1	0.2	0.2
90.	1.1	1.1	1.	0.3	0.4	0.4	0.5	0.5
100.	0.5	0.4	0.4	0.9	0.9	1.1	1.2	1.3
110.	0.1	0.1	0.1	0.8	1.	1.2	1.3	1.4
120.	0.	0.	0.	0.8	0.8	0.9	1.	1.1
130.	0.	0.	0.	0.5	0.7	0.9	1.	1.1
140.	0.	0.	0.	0.4	0.4	0.8	1.	1.
150.	0.	0.	0.	0.2	0.4	0.5	0.8	0.9
160.	0.	0.	0.	0.2	0.2	0.4	0.6	0.8
170.	0.	0.	0.	0.2	0.2	0.2	0.5	0.7
180.	0.	0.	0.	0.1	0.2	0.2	0.3	0.7
190.	0.	0.	0.	0.	0.1	0.2	0.2	0.5
200.	0.	0.	0.	0.	0.1	0.2	0.2	0.4
210.	0.	0.	0.	0.	0.	0.1	0.2	0.3
220.	0.	0.	0.	0.	0.	0.1	0.1	0.3

230.	*	0.	0.	0.	0.	0.	0.	0.1	0.2
240.	*	0.	0.	0.	0.	0.	0.	0.	0.2
250.	*	0.	0.	0.	0.	0.	0.	0.	0.1
260.	*	0.	0.	0.	0.	0.	0.	0.	0.
270.	*	0.	0.	0.	0.	0.	0.	0.	0.
280.	*	0.1	0.	0.	0.	0.	0.	0.	0.
290.	*	0.1	0.	0.	0.	0.	0.	0.	0.
300.	*	0.2	0.	0.	0.	0.	0.	0.	0.
310.	*	0.2	0.1	0.	0.	0.	0.	0.	0.
320.	*	0.2	0.1	0.	0.	0.	0.	0.	0.
330.	*	0.3	0.1	0.	0.	0.	0.	0.	0.
340.	*	0.3	0.2	0.	0.	0.	0.	0.	0.
350.	*	0.3	0.2	0.1	0.	0.	0.	0.	0.
360.	*	0.3	0.3	0.1	0.	0.	0.	0.	0.
------	*	----------	----------	----------	----------	----------	----------	----------	----------
MAX	*	1.3	1.1	1.1	0.9	1.	1.2	1.3	1.4
DEGR.	*	80	80	80	100	110	110	110	110

THE HIGHEST CONCENTRATION OF 1.50 ppm OCCURRED AT RECEPTOR REC73.

FF

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*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/7/2012 2:08:35 PM
** File: F:\2975 FirstLight\Microscale\Worst\49 Rte 44 & Orchard LOS&ADT\2022AAM.ou2
**
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: FirstLight-Taunton-Rte 44 & Orchard St- Build A AM RUN: CAL3QHC RUN

DATE : 12/ 7/12
TIME : 14: 8:34

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE
VPH EF H W V/C QUEUE	*	X1	Y1	X2	Y2	*	(M)		
	*	(DEG)	(G/MI)	(M)	(M)	(VEH)			
1. EBTL	*	238118.14	850750.62	238199.34	850742.50	*	82.	96.	AG
1437. 8.5 0.0 13.4									
2. EBTLQ	*	238199.34	850742.50	238127.42	850749.69	*	72.	276.	AG
119. 100.0 0.0 7.4 0.84 12.0									
3. EBRL	*	238167.22	850742.50	238197.22	850740.06	*	30.	95.	AG

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 162.   8.5   0.0    9.0
 4. EBRLQ                          *  238197.22    850740.06   238181.61    850741.31 *      16.   275. AG
 59. 100.0   0.0    3.0 0.19   2.6
 5. WBLT                           *  238300.23    850741.88   238230.86    850748.50 *      70.   275. AG
 779.   8.5   0.0   13.4
 6. WBLTQ                          *  238230.86    850748.50   238276.03    850744.19 *      45.    96. AG
 144. 100.0   0.0    7.4 0.59   7.6
 7. WBRL                           *  238299.03    850746.69   238231.45    850754.00 *      68.   276. AG
 45.   8.5   0.0    9.4
 8. WBRLQ                          *  238231.45    850754.00   238235.62    850753.56 *       4.    97. AG
 57. 100.0   0.0    3.4 0.05   0.7
 9. NBLL                           *  238225.09    850675.19   238217.52    850730.06 *      55.   352. AG
 375.   8.5   0.0    9.7
10. NBLLQ                          *  238217.52    850730.06   238226.62    850664.06 *      67.   172. AG
88. 100.0   0.0    3.7 0.91  11.1
11. NBTR                           *  238229.05    850675.50   238221.16    850730.06 *      55.   352. AG
124.   8.5   0.0   10.0
12. NBTRQ                          *  238221.16    850730.06   238224.22    850708.94 *      21.   172. AG
103. 100.0   0.0    4.0 0.66   3.6
13. SBLL                           *  238200.86    850837.00   238209.34    850762.75 *      75.   173. AG
96.   8.5   0.0    9.7
14. SBLLQ                          *  238209.34    850762.75   238207.56    850778.31 *      16.   353. AG
101. 100.0   0.0    3.7 0.43   2.6
15. SBTR                           *  238200.25    850836.69   238204.80    850763.69 *      73.   176. AG
182.   8.5   0.0    9.7
16. SBTRQ                          *  238204.80    850763.69   238184.66    851087.19 *     324.   356. AG
109. 100.0   0.0    3.7 1.94  54.0
17. EBOUT                          *  238232.06    850738.25   238299.34    850731.56 *      68.    96. AG
1516.   8.5   0.0   13.4
18. WBOUT                          *  238198.44    850754.25   238133.30    850759.44 *      65.   275. AG
1256.   8.5   0.0   13.4
19. NBOUT                          *  238213.58    850762.50   238204.19    850836.12 *      74.   353. AG
186.   8.5   0.0    9.4
20. SBOUT                          *  238209.64    850730.62   238221.16    850675.50 *      56.   168. AG
242.   8.5   0.0    9.0
21. EBL                            *  238199.95    850742.50   238213.77    850761.88 *      24.    35. AG
49.   9.4   0.0    9.0
22. EBT                            *  238199.77    850742.12   238231.58    850738.50 *      32.    97. AG
1388.   8.5   0.0   12.0
23. EBR                            *  238197.95    850740.06   238209.58    850731.88 *      14.   125. AG
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162.  10.3   0.0    9.0
24. WBL                          *  238229.97    850749.00   238209.77    850732.31 *      26.   230. AG
23.   9.4   0.0    9.0
25. WBT                          *  238230.06    850748.75   238197.77    850754.25 *      33.   280. AG
756.   8.5   0.0   12.0
26. WBR                          *  238230.81    850753.88   238213.69    850760.75 *      18.   292. AG
45.  10.3   0.0    9.0
27. NBL                          *  238217.69    850731.38   238199.09    850754.06 *      29.   321. AG
375.   9.4   0.0    9.0
28. NBT                          *  238221.11    850730.94   238214.62    850761.75 *      31.   348. AG
92.   8.5   0.0    9.0
29. NBR                          *  238221.39    850730.06   238232.73    850737.88 *      14.    55. AG
32.  10.3   0.0    9.0
30. SBL                          *  238209.11    850762.25   238229.58    850738.81 *      31.   139. AG
96.   9.4   0.0    9.0
31. SBT                          *  238205.02    850763.12   238209.02    850733.38 *      30.   172. AG
57.   8.5   0.0    9.0
32. SBR                          *  238204.53    850762.81   238192.25    850754.06 *      15.   235. AG
125.  10.3   0.0    9.0
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JOB: FirstLight-Taunton-Rte 44 & Orchard St- Build A AM                  RUN: CAL3QHC
RUN

DATE : 12/ 7/12
TIME : 14: 8:34

 ADDITIONAL QUEUE LINK PARAMETERS
 --------------------------------
            LINK DESCRIPTION             *    CYCLE    RED     CLEARANCE  APPROACH  SATURATION   IDLE   SIGNAL
            ARRIVAL
                                         *    LENGTH   TIME    LOST TIME    VOL     FLOW RATE   EM FAC   TYPE     RATE
                                         *     (SEC)   (SEC)    (SEC)      (VPH)     (VPH)    (gm/hr)

-----------------------------------------*-------------------------------------------------------------------------
----
 2. EBTLQ                                *     120       58       6.0      1437       1900      45.89      3        3
 4. EBRLQ                                *     120       58       6.0       162       1900      45.89      3        3
 6. WBLTQ                                *     120       70       6.0       779       1900      45.89      3        3
 8. WBRLQ                                *     120       56       6.0        45       1900      45.89      3        3
10. NBLLQ                                *     120       86       6.0       375       1900      45.89      3        3
```

12. NBTRQ	*	120	100	6.0	124	1900	45.89	3	3
14. SBLLQ	*	120	98	6.0	96	1900	45.89	3	3
16. SBTRQ	*	120	106	6.0	182	1900	45.89	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. R_001	*	238196.62	850836.38	1.8	*
2. R_002	*	238196.92	850831.56	1.8	*
3. R_003	*	238196.62	850826.12	1.8	*
4. R_004	*	238196.92	850820.31	1.8	*
5. R_005	*	238196.92	850814.25	1.8	*
6. R_006	*	238197.52	850809.12	1.8	*
7. R_007	*	238199.05	850801.56	1.8	*
8. R_008	*	238198.44	850795.50	1.8	*
9. R_009	*	238199.95	850788.25	1.8	*
10. R_010	*	238201.45	850782.44	1.8	*
11. R_011	*	238201.77	850776.12	1.8	*
12. R_012	*	238200.25	850770.62	1.8	*
13. R_013	*	238196.92	850764.88	1.8	*
14. R_014	*	238191.77	850762.19	1.8	*
15. R_015	*	238184.80	850761.56	1.8	*
16. R_016	*	238176.62	850761.56	1.8	*
17. R_017	*	238169.66	850762.19	1.8	*
18. R_018	*	238161.77	850763.38	1.8	*
19. R_019	*	238155.41	850764.88	1.8	*
20. R_020	*	238208.12	850837.00	1.8	*
21. R_021	*	238207.22	850832.19	1.8	*
22. R_022	*	238208.44	850824.88	1.8	*
23. R_023	*	238209.34	850820.94	1.8	*
24. R_024	*	238209.95	850814.88	1.8	*
25. R_025	*	238210.55	850807.31	1.8	*
26. R_026	*	238210.86	850800.62	1.8	*
27. R_027	*	238211.77	850794.56	1.8	*

FF

RECEPTOR	COORDINATES (M) X	Y	Z
28. R_028	238212.98	850785.50	1.8
29. R_029	238214.48	850776.69	1.8
30. R_030	238216.61	850768.81	1.8
31. R_031	238220.86	850762.75	1.8
32. R_032	238225.41	850759.12	1.8
33. R_033	238232.38	850757.62	1.8
34. R_034	238239.95	850756.69	1.8
35. R_035	238249.64	850756.44	1.8
36. R_036	238257.22	850755.19	1.8
37. R_037	238266.31	850754.56	1.8
38. R_038	238274.19	850754.25	1.8
39. R_039	238282.38	850754.00	1.8
40. R_040	238289.34	850753.38	1.8
41. R_041	238295.41	850753.38	1.8
42. R_042	238299.64	850752.75	1.8
43. R_043	238299.34	850724.56	1.8
44. R_044	238292.06	850725.50	1.8
45. R_045	238284.19	850726.44	1.8
46. R_046	238275.70	850727.31	1.8
47. R_047	238267.81	850728.25	1.8
48. R_048	238261.16	850729.44	1.8
49. R_049	238254.48	850730.62	1.8
50. R_050	238247.81	850731.56	1.8
51. R_051	238240.55	850731.88	1.8
52. R_052	238234.48	850730.94	1.8
53. R_053	238229.95	850728.25	1.8
54. R_054	238227.52	850725.19	1.8
55. R_055	238226.31	850719.12	1.8
56. R_056	238226.92	850712.19	1.8
57. R_057	238228.44	850700.38	1.8
58. R_058	238229.05	850695.50	1.8
59. R_059	238229.95	850690.06	1.8
60. R_060	238230.55	850685.19	1.8
61. R_061	238231.16	850680.06	1.8
62. R_062	238232.06	850675.50	1.8
63. R_063	238217.52	850675.50	1.8
64. R_064	238216.61	850680.62	1.8

65. R_065	238215.09	850687.00	1.8
66. R_066	238213.89	850695.19	1.8
67. R_067	238212.98	850704.31	1.8
68. R_068	238211.45	850710.94	1.8
69. R_069	238208.73	850719.75	1.8
70. R_070	238205.70	850726.12	1.8
71. R_071	238202.06	850731.56	1.8
72. R_072	238194.80	850734.88	1.8
73. R_073	238186.92	850736.44	1.8
74. R_074	238179.95	850737.00	1.8
75. R_075	238171.77	850736.12	1.8
76. R_076	238164.50	850735.19	1.8
77. R_077	238227.22	850707.00	1.8
78. R_078	238146.92	850739.44	1.8
79. R_079	238138.44	850740.06	1.8

FF

JOB: FirstLight-Taunton-Rte 44 & Orchard St- Build A AM RUN: CAL3QHC
RUN

RECEPTOR	COORDINATES (M) X	Y	Z
80. R_080	238132.08	850740.38	1.8
81. R_081	238126.62	850741.56	1.8
82. R_082	238121.17	850741.88	1.8
83. R_083	238117.23	850741.88	1.8
84. R_084	238117.53	850767.94	1.8
85. R_085	238122.08	850768.25	1.8
86. R_086	238127.83	850767.00	1.8
87. R_087	238131.77	850766.38	1.8
88. R_088	238135.11	850766.12	1.8

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	*	0.5	0.5	0.4	0.5	0.5	0.5	0.6	0.5	0.6	0.8	0.8	0.6	0.3	0.2	0.1	0.1	0.1	0.1	0.	0.2
10.	*	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.6	0.7	0.9	0.9	0.6	0.5	0.3	0.2	0.1	0.1	0.1	0.1	0.1
20.	*	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.9	0.8	0.6	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.
30.	*	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.5	0.5	0.2	0.2	0.1	0.1	0.1	0.1	0.
40.	*	0.4	0.4	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.5	0.3	0.1	0.1	0.1	0.1	0.1	0.
50.	*	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.5	0.5	0.5	0.3	0.3	0.1	0.2	0.2	0.1	0.1	0.
60.	*	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.
70.	*	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.4	0.2	0.3	0.3	0.2	0.2	0.1	0.
80.	*	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.6	0.6	0.3	0.2	0.3	0.4	0.3	0.3	0.2	0.
90.	*	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.6	0.6	0.4	0.5	0.5	0.5	0.5	0.4	0.2	0.
100.	*	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.6	0.8	0.5	0.5	0.7	0.9	0.9	0.9	0.8	0.
110.	*	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.8	0.9	0.9	0.7	0.8	0.9	0.9	1.	1.1	1.	0.
120.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.7	0.8	0.8	0.9	1.1	0.7	0.8	0.9	0.9	0.9	0.9	1.	0.
130.	*	0.6	0.6	0.5	0.5	0.6	0.6	0.8	0.7	0.9	1.1	1.3	1.	0.4	0.8	0.9	0.9	1.	0.9	0.8	0.
140.	*	0.7	0.8	0.8	0.8	0.7	0.7	0.8	0.8	0.8	1.2	1.2	0.7	0.5	0.7	0.9	1.	1.	0.9	0.9	0.
150.	*	0.9	0.9	0.8	0.8	0.7	0.7	0.8	1.	1.	1.2	1.	0.5	0.7	0.9	0.9	1.				

```
 0.9    0.9    0.9    0.2
 160.  *    0.8    0.8    0.5    0.5    0.6    0.7    0.9    0.8    0.9    1.2     1.    0.6    0.6    0.7    0.7    0.8
 0.8    0.8    0.8    0.2
 170.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.7    0.8    0.8     1.    0.9    0.4    0.7    0.6    0.8    0.8
 0.8    0.7    0.7    0.2
 180.  *    0.4    0.4    0.3    0.4    0.5    0.5    0.5    0.5    0.7    0.8    0.7    0.6    0.6    0.8    0.8    0.8
 0.8    0.8    0.7    0.3
 190.  *    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.4    0.5    0.5    0.4    0.5    0.8    0.8    0.8
 0.8    0.8    0.7    0.6
 200.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.3    0.5    0.7    0.7    0.7    0.8
 0.8    0.7    0.7    0.8
 210.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.5    0.5    0.7    0.7    0.8    0.8
 0.8    0.8    0.7    0.8
 220.  *    0.1    0.1    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.5    0.6    0.7    0.8    0.9    0.9
 0.9    0.9    0.9    0.7

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.9    0.9    0.8    0.8    0.7    0.7    0.9     1.     1.    1.2    1.3    1.1    0.7    0.9    0.9     1.
 1.    1.1     1.    0.8
 DEGR. *    150    150    140    140    140    140    160    150    150    140    130    120    110    150    110    140
 110    110    110    200
```



```
       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC1   REC2   REC3   REC4   REC5   REC6   REC7   REC8   REC9   REC10  REC11  REC12  REC13  REC14  REC15  REC16
 REC17  REC18  REC19  REC20

 ------*-------------------------------------------------------------------------------------------------------------------
```

```
---------------------
230.  *     0.     0.     0.     0.    0.2    0.2    0.3    0.3    0.3    0.4    0.5    0.6    0.7    0.9    0.9    0.9
0.9    0.9    0.8    0.2
240.  *     0.     0.     0.     0.     0.     0.    0.2    0.2    0.3    0.4    0.5    0.7    0.8    0.9     1.     1.
1.     1.    0.7    0.2
250.  *     0.     0.     0.     0.     0.     0.     0.     0.    0.2    0.3    0.4    0.5    0.8     1.     1.     1.
0.9    0.8    0.7    0.2
260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.4    0.6    0.8    0.8    0.8
0.8    0.6    0.4    0.2
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.3    0.6    0.7    0.6
0.6    0.5    0.3    0.2
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.3    0.4
0.3    0.3    0.1    0.2
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.2
0.2    0.1    0.1    0.2
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1
0.1    0.1     0.    0.2
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1
0.1    0.1     0.    0.2
320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1
0.1     0.     0.    0.3
330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.    0.3
340.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.1     0.     0.     0.     0.
0.     0.     0.    0.3
350.  *    0.3    0.3    0.3    0.3    0.2    0.3    0.4    0.4    0.4    0.6    0.6    0.4    0.2    0.1    0.1     0.
0.     0.     0.    0.3
360.  *    0.5    0.5    0.4    0.5    0.5    0.5    0.6    0.5    0.6    0.8    0.8    0.6    0.3    0.2    0.1    0.1
0.1    0.1     0.    0.2

------*-------------------------------------------------------------------------------------------------------------------
---------------------
MAX   *    0.9    0.9    0.8    0.8    0.7    0.7    0.9     1.     1.    1.2    1.3    1.1    0.8     1.     1.     1.
1.    1.1     1.    0.8
DEGR. *    150    150    140    140    140    140    160    150    150    140    130    120    240    250    240    140
110    110    110    200

      MODEL RESULTS
      -------------
```

```
      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
 REC37  REC38  REC39  REC40

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1    0.1     0.     0.     0.
   0.     0.     0.     0.
  10.  *    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  20.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  30.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1    0.1     0.     0.     0.
 0.     0.     0.     0.
 DEGR. *      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
 0      0      0      0
FF                                                                                                          PAGE    6

      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.
```

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
50.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
60.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
70.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
80.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.2	0.1	0.1	0.	0.	0.	0.
100.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.3	0.5	0.5	0.5	0.2	0.2	0.1	0.1	0.	0.
110.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.3	0.3	0.5	0.7	0.8	0.8	0.5	0.4	0.3	0.1	0.1	0.
120.	* 0.	0.	0.	0.	0.	0.	0.	0.3	0.3	0.5	0.7	1.	0.9	0.9	0.7	0.6	0.4	0.3	0.1	0.1
130.	* 0.	0.	0.	0.	0.1	0.3	0.3	0.3	0.5	0.5	0.6	0.9	1.	0.9	0.8	0.7	0.6	0.3	0.3	0.1
140.	* 0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.6	0.6	0.7	1.	0.9	0.9	0.9	0.6	0.4	0.3	0.1
150.	* 0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.5	0.4	0.5	0.6	0.9	0.9	0.8	0.8	0.7	0.4	0.4	0.3
160.	* 0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.3	0.3	0.4	0.5	0.8	0.9	0.7	0.9	0.7	0.5	0.4	0.4
170.	* 0.2	0.2	0.3	0.2	0.2	0.3	0.5	0.4	0.4	0.5	0.5	0.5	0.8	0.8	0.7	0.7	0.7	0.6	0.4	0.4
180.	* 0.4	0.3	0.3	0.3	0.4	0.5	0.5	0.5	0.4	0.4	0.6	0.6	0.7	0.8	0.7	0.7	0.7	0.6	0.4	0.4
190.	* 0.6	0.6	0.5	0.4	0.5	0.6	0.5	0.6	0.4	0.4	0.5	0.6	1.	0.8	0.7	0.7	0.7	0.7	0.4	0.4

```
200.  *    0.8    0.8    0.8    0.8    0.7    0.7    0.7    0.8    0.6    0.2    0.4    0.5    0.8    0.9    0.8    0.8
0.7    0.7    0.5    0.4
210.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.6    0.8    0.8    0.4    0.5    0.4    0.4    0.9    0.9    0.9
0.8    0.7    0.5    0.4
220.  *    0.7    0.8    0.8    0.7    0.7    0.7    0.6    0.7    0.7    0.7    0.6    0.4    0.4    0.8    1.1    0.9
0.9    0.9    0.6    0.5
230.  *    0.5    0.5    0.5    0.5    0.6    0.6    0.6    0.7     1.    0.6    0.5    0.7    0.4    0.7    0.7    0.9
0.9    0.9    0.7    0.6
240.  *    0.3    0.3    0.3    0.3    0.5    0.4    0.5    0.5     1.     1.    0.6    0.5    0.6    0.7    0.8    0.8
0.9    0.8    0.8    0.6
250.  *    0.2    0.2    0.3    0.2    0.2    0.2    0.3    0.5    0.8    0.9    0.7    0.8    0.7    0.8    0.8     1.
0.9    0.9    0.9    0.8
260.  *    0.2    0.2    0.3    0.2    0.2    0.2    0.2    0.3    0.6    0.8    0.6    0.8    0.7    0.8    0.7    0.9
1.     1.    0.9    0.9
270.  *    0.2    0.2    0.3    0.2    0.2    0.2    0.2    0.2    0.4    0.7    0.6    0.5    0.5    0.4    0.5    0.7
0.7    0.8    0.7    0.7
280.  *    0.2    0.2    0.3    0.3    0.2    0.2    0.2    0.2    0.3    0.5    0.3    0.3    0.3    0.3    0.3    0.2
0.3    0.3    0.3    0.2
290.  *    0.2    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.4    0.5    0.2    0.2    0.2    0.2    0.1    0.1
0.1    0.1    0.1     0.
300.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.5    0.4    0.2    0.2    0.2    0.1    0.1
0.1    0.1    0.1    0.1
310.  *    0.3    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.5    0.4    0.2    0.2    0.1    0.1    0.1
0.1    0.1    0.1    0.1
320.  *    0.3    0.4    0.4    0.4    0.5    0.5    0.5    0.3    0.3    0.4    0.4    0.3    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
330.  *    0.3    0.4    0.4    0.4    0.4    0.5    0.5    0.4    0.4    0.4    0.4    0.2    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
340.  *    0.4    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.1    0.1    0.1
0.1    0.1    0.1     0.
350.  *    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.1    0.1    0.1    0.1
0.     0.     0.     0.
360.  *    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1    0.1     0.     0.     0.
0.     0.     0.     0.

------*-------------------------------------------------------------------------------------------------------------
--------------------
MAX   *    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.8     1.     1.    0.7     1.     1.    0.9    1.1     1.
1.     1.    0.9    0.9
DEGR. *    200    200    200    200    210    210    200    200    230    240    120    120    130    120    220    250
```

260 260 250 260

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	*	0.	0.	0.3	0.5	0.5	0.6	0.7	0.8	0.8	0.8	0.7	0.8	0.7	0.5	0.4	0.3	0.5	0.5	0.5	0.6
10.	*	0.	0.	0.1	0.5	0.5	0.6	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.5	0.4	0.4	0.2	0.2	0.2	0.2
20.	*	0.	0.	0.1	0.5	0.5	0.5	0.7	0.7	0.8	0.8	0.8	0.7	0.6	0.6	0.4	0.3	0.3	0.3	0.3	0.3
30.	*	0.	0.	0.	0.5	0.5	0.5	0.6	0.7	0.8	0.8	0.8	0.7	0.6	0.6	0.5	0.4	0.4	0.3	0.3	0.3
40.	*	0.	0.	0.	0.3	0.5	0.5	0.6	0.8	0.9	1.	1.	0.7	0.6	0.6	0.5	0.4	0.4	0.3	0.3	0.2
50.	*	0.	0.	0.	0.3	0.5	0.6	0.6	0.7	0.9	1.	1.	1.	0.7	0.6	0.6	0.4	0.4	0.2	0.1	0.1
60.	*	0.	0.	0.	0.2	0.4	0.6	0.6	0.7	0.9	1.	1.	0.9	0.7	0.6	0.5	0.4	0.1	0.1	0.1	0.1
70.	*	0.	0.	0.	0.2	0.4	0.5	0.7	0.7	0.8	0.8	1.	0.9	0.8	0.6	0.5	0.2	0.1	0.1	0.	0.
80.	*	0.	0.	0.	0.2	0.3	0.5	0.5	0.7	0.8	0.9	0.9	0.8	0.7	0.5	0.2	0.1	0.	0.	0.	0.
90.	*	0.	0.	0.	0.1	0.3	0.4	0.5	0.6	0.6	0.8	0.8	0.7	0.3	0.2	0.1	0.	0.	0.	0.	0.

100.	*	0.	0.	0.	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.5	0.4	0.1	0.1	0.	0.
0.	0.	0.	0.														
110.	*	0.	0.	0.	0.	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.2	0.	0.	0.	0.
0.	0.	0.	0.														
120.	*	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.	0.	0.	0.
0.	0.	0.	0.														
130.	*	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.
0.	0.	0.	0.														
140.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.
0.	0.	0.	0.														
150.	*	0.1	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.	0.	0.	0.	0.
0.	0.	0.	0.														
160.	*	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.														
170.	*	0.2	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.3	0.2
0.2	0.1	0.	0.														
180.	*	0.4	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.3	0.6	0.4
0.3	0.3	0.1	0.1														
190.	*	0.4	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.4	0.6	0.7	0.5
0.4	0.4	0.3	0.1														
200.	*	0.4	0.4	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.3	0.5	0.5	0.7	0.5
0.4	0.4	0.3	0.3														
210.	*	0.4	0.4	0.	0.	0.	0.	0.	0.	0.1	0.1	0.2	0.3	0.5	0.6	0.7	0.5
0.3	0.3	0.3	0.3														
220.	*	0.4	0.4	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.5
0.3	0.3	0.3	0.3														
230.	*	0.5	0.5	0.	0.	0.	0.	0.1	0.2	0.2	0.3	0.2	0.4	0.4	0.6	0.6	0.5
0.3	0.3	0.3	0.3														
240.	*	0.5	0.6	0.	0.	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.6	0.6	0.6
0.3	0.3	0.3	0.3														
250.	*	0.6	0.6	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.6	0.6	0.6
0.3	0.3	0.3	0.3														
260.	*	0.9	0.7	0.1	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.4	0.2	0.4	0.6	0.6	0.6
0.3	0.3	0.3	0.3														
270.	*	0.7	0.7	0.4	0.4	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.4	0.6	0.8	0.6	0.6
0.3	0.3	0.3	0.3														
280.	*	0.2	0.2	1.1	1.1	1.1	0.9	0.9	0.9	1.	1.	1.	0.9	0.8	0.9	0.8	0.7
0.3	0.3	0.3	0.3														
290.	*	0.	0.	0.9	1.3	1.2	1.2	1.3	1.2	1.1	1.	1.	1.	0.9	1.	1.	0.9
0.4	0.4	0.3	0.4														

```
300.  *    0.1    0.1    0.9    0.9    0.9    0.9    1.1     1.    1.1     1.     1.     1.    0.7     1.    1.3    1.1
0.6    0.6    0.6    0.6
310.  *    0.1    0.1    0.9    1.1    1.2    1.1     1.     1.    1.1     1.    0.7    0.7    0.7    0.8    1.2    1.1
0.6    0.7    0.7    0.7
320.  *    0.1    0.1    0.7    0.9     1.    1.1     1.     1.    0.9     1.    0.9    0.6    0.6    0.7    1.3    1.1
0.9    0.7    0.8    0.8
330.  *    0.1    0.1    0.6    0.8    0.9    0.9     1.     1.     1.    0.8    0.9    0.7    0.5    0.5     1.    1.3
0.9    0.9    0.9    0.8
340.  *     0.     0.    0.4    0.6    0.7    0.8    0.8    0.8    0.9    0.9    0.8    0.7    0.6    0.6    0.6     1.
0.9    0.8    0.7    0.7
350.  *     0.     0.    0.4    0.5    0.5    0.7    0.7    0.9    0.9    0.9    0.8    0.8    0.5    0.6    0.6    0.6
0.7    0.7    0.6    0.6
360.  *     0.     0.    0.3    0.5    0.5    0.6    0.7    0.8    0.8    0.8    0.7    0.8    0.7    0.5    0.4    0.3
0.5    0.5    0.5    0.6

------*-------------------------------------------------------------------------------------------------------------------
----------------------
MAX   *    0.9    0.7    1.1    1.3    1.2    1.2    1.3    1.2    1.1     1.     1.     1.    0.9     1.    1.3    1.3
0.9    0.9    0.9    0.8
DEGR. *    260    260    280    290    290    290    290    290    290     40     40     50    290    290    300    330
320    330    330    320
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

```
WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
REC77  REC78  REC79  REC80

------*-------------------------------------------------------------------------------------------------------------------
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```

```
   .  *    0.7    0.5    0.7    0.7    0.6    0.5    0.5    0.6    0.7    0.6    0.9    1.2    1.2     1.     1.    0.9
   0.4    0.9    0.9    0.8
  10.  *    0.2    0.2    0.6    0.6    0.6    0.7    0.7    0.6    0.6    0.5    0.9    1.1    1.3    1.1     1.    0.9
  0.4     1.     1.    0.9
  20.  *    0.2    0.2    0.6    0.7    0.7    0.8    0.7    0.5    0.5    0.4    0.7    1.1    1.3    1.1    0.9    0.9
  0.3     1.    0.9    0.9
  30.  *    0.3    0.2    0.6    0.7    0.8    0.8     1.    0.8    0.4    0.5    0.6     1.    1.2    1.1    0.9    0.9
  0.4     1.     1.     1.
  40.  *    0.1    0.1    0.6    0.6    0.7    0.8    0.9     1.    0.7    0.6    0.6    0.7    1.1    1.2     1.     1.
  0.4     1.     1.     1.
  50.  *    0.1    0.1    0.5    0.5    0.5    0.7     1.     1.    0.8    0.6    0.7    0.7    1.1    1.3     1.     1.
  0.4    1.1     1.     1.
  60.  *     0.     0.    0.4    0.5    0.5    0.5    0.9     1.    0.9    0.8    0.9    0.7     1.    1.3    1.1    0.8
  0.3    1.1    1.2    1.2
  70.  *     0.     0.    0.4    0.4    0.4    0.5    0.6     1.    0.9    0.8    0.9    1.1    1.2    1.3    1.2     1.
  0.1    1.1    1.1    1.1
  80.  *     0.     0.    0.3    0.4    0.4    0.4    0.5    0.6    0.9    0.9    0.7     1.    1.2    1.3    1.2    1.1
  0.1    1.2    1.1     1.
  90.  *     0.     0.    0.3    0.4    0.4    0.4    0.4    0.5    0.7    0.6    0.5    0.9    0.8     1.    0.8    0.5
  0.    0.9     1.     1.
 100.  *     0.     0.    0.2    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.3    0.3    0.4    0.3    0.3    0.3
 0.    0.5    0.4    0.4
 110.  *     0.     0.    0.2    0.4    0.4    0.4    0.4    0.4    0.5    0.4    0.3    0.3    0.5    0.3    0.1    0.1
 0.    0.1    0.1    0.1
 120.  *     0.     0.    0.2    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.4    0.2    0.2    0.1    0.1    0.1
 0.     0.     0.     0.
 130.  *     0.     0.    0.2    0.3    0.4    0.4    0.4    0.4    0.5    0.5    0.4    0.3    0.1    0.1    0.1    0.1
 0.     0.     0.     0.
 140.  *     0.     0.    0.1    0.3    0.4    0.4    0.4    0.4    0.4    0.5    0.4    0.2    0.1    0.1     0.     0.
 0.     0.     0.     0.
 150.  *     0.     0.    0.1    0.2    0.2    0.4    0.4    0.4    0.4    0.4    0.3    0.1    0.1     0.     0.     0.
 0.     0.     0.     0.
 160.  *     0.     0.     0.    0.1    0.2    0.2    0.4    0.4    0.3    0.3    0.2    0.1     0.     0.     0.     0.
 0.     0.     0.     0.
 170.  *     0.     0.     0.     0.    0.1    0.2    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.
 0.3     0.     0.     0.
 180.  *     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.
 0.4     0.     0.     0.
 190.  *    0.1     0.     0.     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.
 0.4     0.     0.     0.
```

```
200.  *    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.5     0.     0.     0.
210.  *    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.3     0.     0.     0.
220.  *    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.3     0.     0.     0.
230.  *    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.3     0.     0.     0.
240.  *    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.3     0.     0.     0.
250.  *    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.
0.3     0.     0.     0.
260.  *    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.
0.3     0.     0.     0.
270.  *    0.3    0.3     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.4    0.4    0.2    0.1
0.3    0.1    0.1     0.
280.  *    0.3    0.3     0.     0.     0.     0.     0.     0.     0.2    0.3    0.5    0.9     1.    0.8    0.5    0.3
0.4    0.4    0.2    0.1
290.  *    0.4    0.3     0.     0.     0.     0.     0.1    0.2    0.4    0.6    0.9    1.3    1.2    1.1    0.8    0.5
0.6    0.6    0.3    0.2
300.  *    0.5    0.5     0.     0.     0.1    0.2    0.2    0.4    0.5    0.6     1.    1.3    1.3    1.3    0.9    0.8
0.9    0.6    0.5    0.3
310.  *    0.7    0.6    0.2    0.2    0.2    0.3    0.4    0.5    0.5    0.8     1.    1.3    1.3    1.2     1.    0.8
0.9    0.7    0.6    0.3
320.  *    0.8    0.7    0.3    0.3    0.3    0.3    0.4    0.4    0.5    0.7    0.9    1.2    1.3    1.2    0.9    0.9
1.2    0.8    0.7    0.4
330.  *    0.9    0.8    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.6    0.9     1.    1.2     1.    0.9    0.9
1.    0.8    0.7    0.5
340.  *    0.7    0.7    0.4    0.4    0.5    0.6    0.6    0.6    0.6    0.5    0.8     1.     1.    0.9    0.9    0.8
1.    0.9    0.8    0.5
350.  *    0.6    0.6    0.5    0.4    0.4    0.3    0.3    0.4    0.7    0.9    0.9    1.1    1.2    0.9    0.8    0.8
0.9    0.8    0.7    0.5
360.  *    0.7    0.5    0.7    0.7    0.6    0.5    0.5    0.6    0.7    0.6    0.9    1.2    1.2     1.     1.    0.9
0.4    0.9    0.9    0.8

------*-------------------------------------------------------------------------------------------------------------
--------------------
MAX   *    0.9    0.8    0.7    0.7    0.8    0.8     1.     1.    0.9    0.9     1.    1.3    1.3    1.3    1.2    1.1
1.2    1.2    1.2    1.2
DEGR. *    330    330      0      0     30     20     30     40     60     80    300    290     10     50     70     80
```

320 80 60 60

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88
.	0.5	0.3	0.1	0.	0.	0.	0.	0.
10.	0.7	0.4	0.2	0.	0.	0.	0.	0.1
20.	0.8	0.5	0.4	0.1	0.1	0.1	0.1	0.1
30.	1.	0.7	0.4	0.1	0.1	0.1	0.1	0.1
40.	1.	0.8	0.7	0.1	0.1	0.1	0.1	0.1
50.	1.1	0.9	0.7	0.1	0.1	0.1	0.1	0.1
60.	1.2	1.1	0.9	0.1	0.1	0.1	0.1	0.1
70.	1.1	1.1	1.	0.1	0.1	0.1	0.1	0.2
80.	1.2	1.2	1.1	0.1	0.1	0.1	0.1	0.2
90.	1.1	0.9	0.9	0.2	0.2	0.2	0.3	0.3
100.	0.5	0.4	0.3	0.6	0.6	0.7	0.9	0.9
110.	0.1	0.1	0.1	0.7	0.8	0.9	1.1	1.
120.	0.	0.	0.	0.7	0.8	0.9	0.9	1.
130.	0.	0.	0.	0.6	0.7	0.8	0.9	0.9
140.	0.	0.	0.	0.5	0.6	0.7	0.8	0.9
150.	0.	0.	0.	0.3	0.5	0.7	0.8	0.9
160.	0.	0.	0.	0.3	0.3	0.6	0.7	0.8
170.	0.	0.	0.	0.2	0.3	0.5	0.7	0.8
180.	0.	0.	0.	0.1	0.2	0.3	0.5	0.7
190.	0.	0.	0.	0.1	0.1	0.3	0.3	0.6
200.	0.	0.	0.	0.	0.1	0.2	0.3	0.4
210.	0.	0.	0.	0.	0.	0.1	0.2	0.4
220.	0.	0.	0.	0.	0.	0.1	0.1	0.3

230.	*	0.	0.	0.	0.	0.	0.	0.1	0.2
240.	*	0.	0.	0.	0.	0.	0.	0.	0.2
250.	*	0.	0.	0.	0.	0.	0.	0.	0.
260.	*	0.	0.	0.	0.	0.	0.	0.	0.
270.	*	0.	0.	0.	0.	0.	0.	0.	0.
280.	*	0.1	0.	0.	0.	0.	0.	0.	0.
290.	*	0.1	0.	0.	0.	0.	0.	0.	0.
300.	*	0.2	0.	0.	0.	0.	0.	0.	0.
310.	*	0.2	0.1	0.	0.	0.	0.	0.	0.
320.	*	0.3	0.1	0.	0.	0.	0.	0.	0.
330.	*	0.3	0.1	0.	0.	0.	0.	0.	0.
340.	*	0.3	0.2	0.	0.	0.	0.	0.	0.
350.	*	0.5	0.3	0.1	0.	0.	0.	0.	0.
360.	*	0.5	0.3	0.1	0.	0.	0.	0.	0.
------	*	----------	----------	----------	----------	----------	----------	----------	----------
MAX	*	1.2	1.2	1.1	0.7	0.8	0.9	1.1	1.
DEGR.	*	60	80	80	110	110	110	110	110

THE HIGHEST CONCENTRATION OF 1.30 ppm OCCURRED AT RECEPTOR REC73.

FF

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*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/7/2012 3:03:25 PM
** File: F:\2975 FirstLight\Microscale\Worst\49 Rte 44 & Orchard LOS&ADT\2022APM.ou2
**
*********************************************


                    CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                    PAGE  1

     JOB: FirstLight-Taunton-Rte 44 & Orchard St- Build A PM                    RUN: CAL3QHC
     RUN

     DATE : 12/ 7/12
     TIME : 15: 3: 4

        The MODE flag has been set to C for calculating CO averages.

      SITE & METEOROLOGICAL VARIABLES
      -------------------------------
      VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 100. CM
       U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  0.0 PPM

      LINK VARIABLES
      --------------
                 LINK DESCRIPTION               *              LINK COORDINATES (M)              *    LENGTH  BRG TYPE
                 VPH    EF      H     W    V/C QUEUE
                                               *       X1          Y1            X2          Y2    *     (M)
                                              (DEG)            (G/MI)   (M)   (M)       (VEH)

     ------------------------------------------*-------------------------------------------------*------------------------
     ---------------------------------
      1. EBTL                                  *  238118.14    850750.62   238199.34    850742.50 *      82.    96. AG
      1321.   8.5   0.0   13.4
      2. EBTLQ                                 *  238199.34    850742.50   238135.86    850748.88 *      64.   276. AG
      119. 100.0   0.0    7.4 0.77  10.6
      3. EBRL                                  *  238167.22    850742.50   238197.22    850740.06 *      30.    95. AG
```

385. 8.5 0.0 9.0
4. EBRLQ * 238197.22 850740.06 238160.12 850743.06 * 37. 275. AG
59. 100.0 0.0 3.0 0.45 6.2
5. WBLT * 238300.23 850741.88 238230.86 850748.50 * 70. 275. AG
1686. 8.5 0.0 13.4
6. WBLTQ * 238230.86 850748.50 238911.58 850683.50 * 684. 95. AG
144. 100.0 0.0 7.4 1.27 114.0
7. WBRL * 238299.03 850746.69 238231.45 850754.00 * 68. 276. AG
167. 8.5 0.0 9.4
8. WBRLQ * 238231.45 850754.00 238246.95 850752.31 * 16. 96. AG
57. 100.0 0.0 3.4 0.19 2.6
9. NBLL * 238225.09 850675.19 238217.52 850730.06 * 55. 352. AG
290. 8.5 0.0 9.7
10. NBLLQ * 238217.52 850730.06 238222.67 850692.69 * 38. 172. AG
80. 100.0 0.0 3.7 0.54 6.3
11. NBTR * 238229.05 850675.50 238221.16 850730.06 * 55. 352. AG
180. 8.5 0.0 10.0
12. NBTRQ * 238221.16 850730.06 238225.11 850702.75 * 28. 172. AG
94. 100.0 0.0 4.0 0.57 4.6
13. SBLL * 238200.86 850837.00 238209.34 850762.75 * 75. 173. AG
174. 8.5 0.0 9.7
14. SBLLQ * 238209.34 850762.75 238206.38 850788.69 * 26. 353. AG
92. 100.0 0.0 3.7 0.50 4.3
15. SBTR * 238200.25 850836.69 238204.80 850763.69 * 73. 176. AG
273. 8.5 0.0 9.7
16. SBTRQ * 238204.80 850763.69 238190.62 850991.12 * 228. 356. AG
101. 100.0 0.0 3.7 1.24 38.0
17. EBOUT * 238232.06 850738.25 238299.34 850731.56 * 68. 96. AG
1471. 8.5 0.0 13.4
18. WBOUT * 238198.44 850754.25 238133.30 850759.44 * 65. 275. AG
2048. 8.5 0.0 13.4
19. NBOUT * 238213.58 850762.50 238204.19 850836.12 * 74. 353. AG
371. 8.5 0.0 9.4
20. SBOUT * 238209.64 850730.62 238221.16 850675.50 * 56. 168. AG
586. 8.5 0.0 9.0
21. EBL * 238199.95 850742.50 238213.77 850761.88 * 24. 35. AG
89. 9.4 0.0 9.0
22. EBT * 238199.77 850742.12 238231.58 850738.50 * 32. 97. AG
1232. 8.5 0.0 12.0
23. EBR * 238197.95 850740.06 238209.58 850731.88 * 14. 125. AG

385. 10.3 0.0 9.0
24. WBL * 238229.97 850749.00 238209.77 850732.31 * 26. 230. AG
46. 9.4 0.0 9.0
25. WBT * 238230.06 850748.75 238197.77 850754.25 * 33. 280. AG
1640. 8.5 0.0 12.0
26. WBR * 238230.81 850753.88 238213.69 850760.75 * 18. 292. AG
167. 10.3 0.0 9.0
27. NBL * 238217.69 850731.38 238199.09 850754.06 * 29. 321. AG
290. 9.4 0.0 9.0
28. NBT * 238221.11 850730.94 238214.62 850761.75 * 31. 348. AG
115. 8.5 0.0 9.0
29. NBR * 238221.39 850730.06 238232.73 850737.88 * 14. 55. AG
65. 10.3 0.0 9.0
30. SBL * 238209.11 850762.25 238229.58 850738.81 * 31. 139. AG
174. 9.4 0.0 9.0
31. SBT * 238205.02 850763.12 238209.02 850733.38 * 30. 172. AG
155. 8.5 0.0 9.0
32. SBR * 238204.53 850762.81 238192.25 850754.06 * 15. 235. AG
118. 10.3 0.0 9.0

FF

JOB: FirstLight-Taunton-Rte 44 & Orchard St- Build A PM RUN: CAL3QHC
RUN

DATE : 12/ 7/12
TIME : 15: 3: 4

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. EBTLQ	*	120	58	6.0	1321	1900	45.89	3	3
4. EBRLQ	*	120	58	6.0	385	1900	45.89	3	3
6. WBLTQ	*	120	70	6.0	1686	1900	45.89	3	3
8. WBRLQ	*	120	56	6.0	167	1900	45.89	3	3
10. NBLLQ	*	120	78	6.0	290	1900	45.89	3	3

12. NBTRQ	*	120	92	6.0	180	1900	45.89	3	3
14. SBLLQ	*	120	90	6.0	174	1900	45.89	3	3
16. SBTRQ	*	120	98	6.0	273	1900	45.89	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. R_001	*	238196.62	850836.38	1.8	*
2. R_002	*	238196.92	850831.56	1.8	*
3. R_003	*	238196.62	850826.12	1.8	*
4. R_004	*	238196.92	850820.31	1.8	*
5. R_005	*	238196.92	850814.25	1.8	*
6. R_006	*	238197.52	850809.12	1.8	*
7. R_007	*	238199.05	850801.56	1.8	*
8. R_008	*	238198.44	850795.50	1.8	*
9. R_009	*	238199.95	850788.25	1.8	*
10. R_010	*	238201.45	850782.44	1.8	*
11. R_011	*	238201.77	850776.12	1.8	*
12. R_012	*	238200.25	850770.62	1.8	*
13. R_013	*	238196.92	850764.88	1.8	*
14. R_014	*	238191.77	850762.19	1.8	*
15. R_015	*	238184.80	850761.56	1.8	*
16. R_016	*	238176.62	850761.56	1.8	*
17. R_017	*	238169.66	850762.19	1.8	*
18. R_018	*	238161.77	850763.38	1.8	*
19. R_019	*	238155.41	850764.88	1.8	*
20. R_020	*	238208.12	850837.00	1.8	*
21. R_021	*	238207.22	850832.19	1.8	*
22. R_022	*	238208.44	850824.88	1.8	*
23. R_023	*	238209.34	850820.94	1.8	*
24. R_024	*	238209.95	850814.88	1.8	*
25. R_025	*	238210.55	850807.31	1.8	*
26. R_026	*	238210.86	850800.62	1.8	*
27. R_027	*	238211.77	850794.56	1.8	*

FF

RECEPTOR	COORDINATES (M) X	Y	Z
28. R_028	238212.98	850785.50	1.8
29. R_029	238214.48	850776.69	1.8
30. R_030	238216.61	850768.81	1.8
31. R_031	238220.86	850762.75	1.8
32. R_032	238225.41	850759.12	1.8
33. R_033	238232.38	850757.62	1.8
34. R_034	238239.95	850756.69	1.8
35. R_035	238249.64	850756.44	1.8
36. R_036	238257.22	850755.19	1.8
37. R_037	238266.31	850754.56	1.8
38. R_038	238274.19	850754.25	1.8
39. R_039	238282.38	850754.00	1.8
40. R_040	238289.34	850753.38	1.8
41. R_041	238295.41	850753.38	1.8
42. R_042	238299.64	850752.75	1.8
43. R_043	238299.34	850724.56	1.8
44. R_044	238292.06	850725.50	1.8
45. R_045	238284.19	850726.44	1.8
46. R_046	238275.70	850727.31	1.8
47. R_047	238267.81	850728.25	1.8
48. R_048	238261.16	850729.44	1.8
49. R_049	238254.48	850730.62	1.8
50. R_050	238247.81	850731.56	1.8
51. R_051	238240.55	850731.88	1.8
52. R_052	238234.48	850730.94	1.8
53. R_053	238229.95	850728.25	1.8
54. R_054	238227.52	850725.19	1.8
55. R_055	238226.31	850719.12	1.8
56. R_056	238226.92	850712.19	1.8
57. R_057	238228.44	850700.38	1.8
58. R_058	238229.05	850695.50	1.8
59. R_059	238229.95	850690.06	1.8
60. R_060	238230.55	850685.19	1.8
61. R_061	238231.16	850680.06	1.8
62. R_062	238232.06	850675.50	1.8
63. R_063	238217.52	850675.50	1.8
64. R_064	238216.61	850680.62	1.8

65. R_065	*	238215.09	850687.00	1.8 *
66. R_066	*	238213.89	850695.19	1.8 *
67. R_067	*	238212.98	850704.31	1.8 *
68. R_068	*	238211.45	850710.94	1.8 *
69. R_069	*	238208.73	850719.75	1.8 *
70. R_070	*	238205.70	850726.12	1.8 *
71. R_071	*	238202.06	850731.56	1.8 *
72. R_072	*	238194.80	850734.88	1.8 *
73. R_073	*	238186.92	850736.44	1.8 *
74. R_074	*	238179.95	850737.00	1.8 *
75. R_075	*	238171.77	850736.12	1.8 *
76. R_076	*	238164.50	850735.19	1.8 *
77. R_077	*	238227.22	850707.00	1.8 *
78. R_078	*	238146.92	850739.44	1.8 *
79. R_079	*	238138.44	850740.06	1.8 *

FF

JOB: FirstLight-Taunton-Rte 44 & Orchard St- Build A PM RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
80. R_080	*	238132.08	850740.38	1.8 *
81. R_081	*	238126.62	850741.56	1.8 *
82. R_082	*	238121.17	850741.88	1.8 *
83. R_083	*	238117.23	850741.88	1.8 *
84. R_084	*	238117.53	850767.94	1.8 *
85. R_085	*	238122.08	850768.25	1.8 *
86. R_086	*	238127.83	850767.00	1.8 *
87. R_087	*	238131.77	850766.38	1.8 *
88. R_088	*	238135.11	850766.12	1.8 *

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

```
 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC1   REC2   REC3   REC4   REC5   REC6   REC7   REC8   REC9   REC10  REC11  REC12  REC13  REC14  REC15  REC16
 REC17  REC18  REC19  REC20

 ------*-----------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.4    0.4    0.5    0.5    0.5    0.5    0.7    0.5    0.7    1.1    1.1    0.5    0.4    0.2    0.1    0.1
   0.     0.     0.    0.1
  10.  *    0.5    0.5    0.5    0.5    0.5    0.6    0.8    0.7    0.8    1.1    1.2    0.9    0.5    0.2    0.2    0.1
  0.1    0.1    0.1     0.
  20.  *    0.4    0.4    0.5    0.6    0.7    0.7    0.8    0.7    0.8    0.9     1.    0.8    0.6    0.4    0.2    0.1
  0.1    0.1    0.1     0.
  30.  *    0.4    0.5    0.5    0.7    0.6    0.7    0.7    0.7    0.7    0.9     1.    0.9    0.6    0.5    0.1    0.1
  0.1    0.1    0.1     0.
  40.  *    0.4    0.5    0.5    0.6    0.6    0.6    0.7    0.6    0.7    0.9    0.9    0.7    0.5    0.5    0.3    0.2
  0.2    0.2    0.1     0.
  50.  *    0.3    0.4    0.5    0.6    0.5    0.5    0.6    0.5    0.5    0.9    0.9    0.7    0.6    0.5    0.3    0.2
  0.2    0.2    0.1     0.
  60.  *    0.3    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.8    0.8    0.7    0.5    0.2    0.3    0.3
  0.2    0.2    0.2     0.
  70.  *    0.3    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.7    0.7    0.7    0.5    0.2    0.3    0.4
  0.4    0.2    0.2     0.
  80.  *    0.3    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.6    0.8    0.8    0.7    0.5    0.3    0.6    0.7
  0.6    0.5    0.3     0.
  90.  *    0.3    0.6    0.5    0.5    0.5    0.5    0.5    0.6    0.7    0.9    0.9    0.8    0.5    0.7    0.8    0.9
  0.9    0.9    0.8     0.
 100.  *    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.9    0.9     1.    1.1    0.9    1.1    1.3    1.5
 1.5    1.3    1.1    0.1
 110.  *    0.6    0.7    0.6    0.6    0.6    0.7    0.7    0.8     1.    1.2    1.4    1.4    0.9    1.4    1.3    1.4
 1.6    1.5    1.5    0.1
 120.  *    0.7    0.7    0.7    0.7    0.8    0.8    0.9     1.    1.2    1.4    1.5    1.2    0.8    1.1    1.2    1.4
 1.3    1.3    1.4    0.1
 130.  *    0.8    0.8    0.8    0.9    0.9    0.9     1.     1.    1.3    1.6    1.3    1.1    0.8    1.1    1.2    1.2
 1.3    1.3    1.2    0.1
 140.  *     1.     1.    0.9    0.9    0.9    0.9    1.1    1.2    1.3    1.5    1.6    0.9    0.7    1.1     1.    1.1
 1.2    1.3    1.1    0.2
 150.  *     1.     1.     1.     1.    1.2    1.2    1.2    1.4    1.3    1.4    1.1    0.7    0.9    1.3    1.1    1.1
```

```
 1.2    1.1    1.1    0.3
 160.  *    0.7    0.8    0.8    0.9    0.9     1.    1.1    0.8     1.    1.2     1.    0.8    0.8     1.     1.    1.2
 1.2    1.1    0.9    0.4
 170.  *    0.9    0.9    0.8    0.8    0.7    0.7    0.7    0.6    0.7    0.9    0.9    0.8    0.9    0.8     1.    1.2
 1.1     1.    0.9    0.4
 180.  *    0.5    0.5    0.4    0.5    0.5    0.6    0.7    0.6    0.8    0.8    0.8    0.6    0.7    1.1    1.2    1.2
 1.1     1.     1.    0.7
 190.  *    0.5    0.5    0.5    0.5    0.4    0.4    0.5    0.4    0.7    0.7    0.7    0.5    0.8    1.1    1.2    1.1
 1.1     1.     1.    0.7
 200.  *    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.6    0.6    0.7    0.9    1.1    1.1    1.1
 1.    0.9    0.9     1.
 210.  *    0.2    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.7     1.     1.    1.1    1.1
 1.     1.    0.9    0.9
 220.  *    0.1    0.2    0.2    0.2    0.3    0.4    0.4    0.4    0.4    0.5    0.6    0.8     1.    1.1    1.1     1.
 1.     1.     1.    0.7

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *     1.     1.     1.     1.    1.2    1.2    1.2    1.4    1.3    1.6    1.6    1.4     1.    1.4    1.3    1.5
 1.6    1.5    1.5     1.
 DEGR. *    140    140    150    150    150    150    150    150    130    130    140    110    210    110    100    100
 110    110    110    200
```

FF PAGE 5

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

```
WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC1   REC2   REC3   REC4   REC5   REC6   REC7   REC8   REC9   REC10  REC11  REC12  REC13  REC14  REC15  REC16
REC17  REC18  REC19  REC20

 ------*-----------------------------------------------------------------------------------------------------------------
```

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---------------------
230.  *     0.     0.     0.    0.1    0.2    0.2    0.3    0.4    0.4    0.5    0.6    0.8    0.9    1.1    1.2    1.2
1.2    1.1    0.9    0.4
240.  *     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.4    0.5    0.6    0.7     1.    1.1    1.3    1.3
1.3     1.     1.    0.4
250.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.5    0.7    0.9    1.2    1.2    1.2
1.1    1.1    0.7    0.4
260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.4    0.8    1.1    1.2    1.2
1.    0.8    0.6    0.2
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.5    0.8    0.9    0.9
0.9    0.6    0.4    0.2
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.4    0.5    0.6
0.5    0.4    0.2    0.2
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.3    0.3
0.3    0.2    0.1    0.2
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.2
0.2    0.1    0.1    0.2
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1
0.1    0.1     0.    0.2
320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1
0.1    0.1     0.    0.3
330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2     0.     0.     0.     0.1    0.1
0.1    0.1     0.    0.3
340.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.1    0.2    0.3    0.3    0.2     0.     0.     0.     0.
0.     0.     0.    0.3
350.  *    0.2    0.2    0.2    0.3    0.3    0.3    0.4    0.3    0.4    0.5    0.5    0.4    0.1    0.1     0.     0.
0.     0.     0.    0.3
360.  *    0.4    0.4    0.5    0.5    0.5    0.5    0.7    0.5    0.7    1.1    1.1    0.5    0.4    0.2    0.1    0.1
0.     0.     0.    0.1

------*-------------------------------------------------------------------------------------------------------------------
---------------------
MAX   *     1.     1.     1.     1.    1.2    1.2    1.2    1.4    1.3    1.6    1.6    1.4     1.    1.4    1.3    1.5
1.6    1.5    1.5     1.
DEGR. *    140    140    150    150    150    150    150    150    130    130    140    110    210    110    100    100
110    110    110    200

      MODEL RESULTS
      -------------
```

```
      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
 REC37  REC38  REC39  REC40

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.3    0.3    0.2    0.2    0.2    0.4    0.3    0.3    0.3    0.2    0.1    0.1     0.     0.     0.     0.
   0.     0.     0.     0.
  10.  *    0.1    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  20.  *     0.     0.     0.     0.    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  30.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.3    0.3    0.2    0.2    0.2    0.4    0.3    0.3    0.3    0.2    0.1    0.1     0.     0.     0.     0.
 0.     0.     0.     0.
 DEGR. *      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
 0      0      0      0
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.
```

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
50.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
60.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
70.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
80.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
90.	* 0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.3	0.5	0.6	0.6	0.4	0.5	0.4	0.4	0.3	0.3
100.	* 0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.7	1.1	1.2	1.1	0.9	0.9	0.8	0.8	0.6	0.5
110.	* 0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.5	0.6	1.	1.4	1.5	1.5	1.2	1.2	1.1	0.9	0.7	0.6
120.	* 0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.8	1.1	1.2	1.6	1.5	1.3	1.3	1.2	1.1	0.8	0.6
130.	* 0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.8	1.1	1.4	1.5	1.5	1.2	1.2	1.2	1.1	1.	0.6
140.	* 0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.6	0.7	0.9	1.1	1.5	1.5	1.3	1.3	1.2	1.2	1.	0.7
150.	* 0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.7	0.9	1.3	1.4	1.1	1.1	1.1	1.1	1.	0.7
160.	* 0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.4	0.7	0.7	1.1	1.3	0.9	1.	1.	0.9	0.9	0.8
170.	* 0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.7	0.7	0.9	1.	1.2	0.9	1.	0.9	0.9	0.9	0.9
180.	* 0.7	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.5	0.8	0.9	0.9	1.	1.2	0.9	0.9	0.9	0.9	0.9	0.9
190.	* 0.8	0.7	0.9	0.9	0.9	1.	0.9	0.8	0.5	0.6	0.8	1.	1.2	1.1	0.9	0.9	0.9	0.9	0.9	0.9

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200.  *     1.     1.     1.    0.9     1.    1.1    1.2     1.    0.6    0.5    0.6    0.9     1.    1.3    0.9    0.9
0.9    0.9    0.9    0.9
210.  *    0.9    0.9    0.8    0.8    0.9     1.    1.1    1.1    0.9    0.7    0.6    0.7    0.8    1.4    1.2     1.
1.    0.9    0.9    0.9
220.  *    0.8    0.7    0.8    0.8    0.9    0.9     1.    1.1    0.9    0.7    0.8    0.7    0.6    1.1    1.5    1.2
1.1    1.1     1.    0.9
230.  *    0.6    0.6    0.6    0.6    0.8    0.9     1.     1.    1.2    0.9    0.9    0.8    0.7    1.1    1.2    1.3
1.2    1.2    1.2    1.2
240.  *    0.4    0.4    0.4    0.5    0.5    0.6    0.8     1.    1.2    1.1     1.    0.9    0.8    1.2    1.3    1.3
1.3    1.2    1.2    1.2
250.  *    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.9    1.1    1.1    0.9    1.1    1.1     1.    1.4    1.4
1.3    1.4    1.3    1.2
260.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.7    0.9    0.9    0.8    1.1    1.1    1.2    1.1    1.3
1.3    1.4    1.4    1.5
270.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.6    0.7    0.7    0.8    0.8    0.9    0.7    0.9    1.1
1.1     1.     1.     1.
280.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.6    0.6    0.7    0.5    0.6    0.5    0.4    0.3    0.6
0.5    0.4    0.4    0.4
290.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.6    0.6    0.3    0.4    0.4    0.3    0.3    0.1
0.1     0.     0.     0.
300.  *    0.3    0.4    0.4    0.5    0.5    0.5    0.5    0.6    0.7    0.6    0.4    0.4    0.2    0.2    0.2    0.1
0.1    0.1    0.1    0.1
310.  *    0.4    0.4    0.5    0.5    0.5    0.5    0.5    0.6    0.7    0.7    0.5    0.3    0.3    0.2    0.1    0.1
0.1    0.1    0.1    0.1
320.  *    0.4    0.5    0.5    0.6    0.6    0.5    0.6    0.6    0.8    0.8    0.5    0.3    0.3    0.1    0.1    0.1
0.1    0.1    0.1    0.1
330.  *    0.4    0.4    0.5    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.5    0.4    0.2    0.1    0.1    0.1
0.1    0.1    0.1    0.1
340.  *    0.4    0.4    0.4    0.5    0.7    0.7    0.7    0.7    0.8    0.7    0.4    0.3    0.1    0.1    0.1    0.1
0.1     0.     0.     0.
350.  *    0.4    0.4    0.4    0.5    0.5    0.5    0.4    0.5    0.4    0.4    0.3    0.1    0.1    0.1     0.     0.
0.     0.     0.     0.
360.  *    0.3    0.3    0.2    0.2    0.2    0.4    0.3    0.3    0.3    0.2    0.1    0.1     0.     0.     0.     0.
0.     0.     0.     0.

------*-------------------------------------------------------------------------------------------------------------
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MAX   *     1.     1.     1.    0.9     1.    1.1    1.2    1.1    1.2    1.1    1.1    1.4    1.6    1.5    1.5    1.4
1.3    1.4    1.4    1.5
DEGR. *    200    200    200    190    200    200    200    210    230    240    120    110    120    110    220    250
```

240 250 260 260

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	*	0.	0.	0.6	0.9	0.9	0.9	0.9	0.9	1.	1.	1.	0.9	0.7	0.6	0.5	0.6	0.9	0.8	0.8	0.8
10.	*	0.	0.	0.4	0.9	0.9	0.9	0.9	1.	1.	1.	1.	1.	0.8	0.6	0.5	0.5	0.4	0.4	0.3	0.3
20.	*	0.	0.	0.3	0.8	0.9	0.9	0.9	1.	1.	1.	1.	0.9	0.7	0.7	0.5	0.3	0.3	0.3	0.3	0.3
30.	*	0.	0.	0.2	0.7	0.9	0.9	0.9	1.	1.	1.	1.	0.9	0.8	0.7	0.6	0.5	0.3	0.3	0.3	0.3
40.	*	0.	0.	0.3	0.7	0.9	1.	1.	1.	1.	1.	1.1	1.	0.8	0.7	0.6	0.6	0.5	0.3	0.3	0.3
50.	*	0.	0.	0.3	0.6	0.9	1.1	1.1	1.1	1.1	1.2	1.1	1.1	0.9	0.8	0.6	0.6	0.4	0.3	0.3	0.3
60.	*	0.	0.	0.3	0.5	0.8	1.	1.1	1.1	1.2	1.3	1.3	1.1	1.	0.8	0.7	0.6	0.3	0.3	0.2	0.2
70.	*	0.	0.	0.3	0.5	0.7	0.9	1.	1.1	1.2	1.2	1.2	1.2	1.1	0.9	0.6	0.5	0.3	0.3	0.1	0.1
80.	*	0.1	0.1	0.4	0.6	0.7	0.8	1.	1.1	1.2	1.3	1.3	1.2	0.9	0.7	0.5	0.3	0.2	0.2	0.2	0.1
90.	*	0.2	0.2	0.3	0.4	0.6	0.7	0.8	0.9	1.1	1.2	1.2	0.9	0.7	0.6	0.3	0.2	0.1	0.1	0.1	0.1

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100.  *    0.4    0.4    0.2    0.3    0.4    0.4    0.5    0.6    0.7    0.7    0.7    0.5    0.2    0.2    0.1    0.1
0.     0.     0.     0.
110.  *    0.5    0.5     0.     0.     0.1    0.1    0.2    0.2    0.3    0.3    0.3    0.2     0.     0.     0.     0.
0.     0.     0.     0.
120.  *    0.4    0.4     0.     0.     0.1    0.1    0.1    0.1    0.1    0.2    0.1    0.1     0.     0.     0.     0.
0.     0.     0.     0.
130.  *    0.5    0.4     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
140.  *    0.5    0.4     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
150.  *    0.5    0.3     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
160.  *    0.6    0.4     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1
0.1    0.1     0.     0.
170.  *    0.7    0.5     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2
0.1    0.1    0.1     0.
180.  *    0.9    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.4    0.5    0.5
0.2    0.1    0.1     0.
190.  *    0.9    0.8     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.5    0.6    0.7    0.7
0.3    0.2    0.2    0.1
200.  *    0.9    0.8     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3    0.6    0.8    0.9    0.8
0.3    0.3    0.2    0.1
210.  *    0.9    0.9     0.     0.     0.     0.     0.     0.     0.     0.     0.3    0.4    0.6    0.8    0.9    0.9
0.4    0.3    0.3    0.2
220.  *    0.9    0.9     0.     0.     0.     0.     0.     0.     0.1    0.4    0.3    0.4    0.5    0.8    0.8    0.9
0.4    0.3    0.3    0.2
230.  *    1.1    1.1     0.     0.     0.     0.     0.     0.1    0.3    0.4    0.3    0.4    0.5    0.7    0.8    0.8
0.4    0.3    0.3    0.2
240.  *    1.2    1.2     0.     0.     0.1    0.1    0.1    0.3    0.3    0.4    0.4    0.3    0.5    0.6    0.8    0.7
0.4    0.3    0.2    0.2
250.  *    1.2    1.2    0.1    0.1    0.1    0.1    0.2    0.3    0.3    0.3    0.4    0.3    0.5    0.5    0.7    0.7
0.4    0.3    0.2    0.2
260.  *    1.3    1.4    0.1    0.2    0.2    0.2    0.3    0.3    0.3    0.5    0.4    0.3    0.4    0.6    0.7    0.7
0.4    0.3    0.2    0.2
270.  *    1.1    1.1    0.3    0.4    0.4    0.6    0.7    0.7    0.7    0.7    0.7    0.5    0.5    0.7    0.7    0.7
0.4    0.4    0.2    0.2
280.  *    0.3    0.3    1.2    1.2    1.2    1.1     1.     1.    1.1     1.    1.2    0.7    0.7    0.9     1.    0.8
0.4    0.4    0.2    0.2
290.  *     0.     0.    1.2    1.2    1.4    1.4    1.3    1.2    1.4    1.2    1.1    1.1     1.     1.    1.2    1.1
0.7    0.5    0.4    0.3
```

```
300.  *     0.     0.    1.2    1.1    1.2    1.3    1.2    1.2    1.1    1.1    1.1    1.1    0.9    1.1    1.4    1.3
0.9    0.8    0.7    0.4
310.  *    0.1    0.1    1.1    1.2    1.2    1.2    1.2    1.2    1.1    1.2    1.1    0.7    0.8    0.9    1.3    1.4
1.    0.9    0.8    0.7
320.  *    0.1    0.1    1.1    1.2    1.2    1.2    1.2    1.2    1.2     1.     1.    0.9    0.7    0.7    1.3    1.4
1.1    0.9    0.9    0.7
330.  *     0.     0.     1.    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.8    0.7    0.6    1.2    1.1
1.3    1.2    1.1    0.9
340.  *     0.     0.    0.8    0.9    0.9    0.9     1.     1.    1.1    1.2     1.    0.9    0.6    0.6    0.8    0.9
1.     1.     1.    0.9
350.  *     0.     0.    0.7    0.9    0.9    0.9    0.9     1.     1.    1.1    1.1    0.9    0.6    0.5    0.6    0.6
0.8    0.8    0.8    0.7
360.  *     0.     0.    0.6    0.9    0.9    0.9    0.9    0.9     1.     1.     1.    0.9    0.7    0.6    0.5    0.6
0.9    0.8    0.8    0.8

------*-----------------------------------------------------------------------------------------------------------------
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MAX   *    1.3    1.4    1.2    1.2    1.4    1.4    1.3    1.2    1.4    1.3    1.3    1.2    1.1    1.1    1.4    1.4
1.3    1.2    1.1    0.9
DEGR. *    260    260    280    280    290    290    290    290    290     60     60     70     70    300    300    310
330    330    330    330
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

```
WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
REC77  REC78  REC79  REC80

------*-----------------------------------------------------------------------------------------------------------------
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```

```
   .  *    0.6    0.5    0.9    0.9    0.9    0.7    0.7    0.6     1.    0.9    1.2    1.3    1.4    1.4    1.2     1.
  0.7    0.9    0.9    0.4
 10.  *    0.3    0.3    0.7     1.    0.9    0.8    0.8    0.7    0.8    0.9     1.    1.4    1.5    1.4    1.2    1.1
 0.5    0.9    0.9    0.6
 20.  *    0.3    0.3    0.9    0.9     1.    1.2     1.    0.7    0.6    0.7    0.8    1.3    1.5    1.3    1.2    1.1
 0.3     1.     1.    0.8
 30.  *    0.3    0.3    0.6    0.7    0.9     1.    1.1     1.    0.6    0.7    0.7     1.    1.4    1.4    1.2    1.2
 0.5     1.     1.    0.9
 40.  *    0.3    0.3    0.6    0.6    0.8    0.9     1.     1.    0.9    0.8    0.7    0.9    1.2    1.6    1.2    1.2
 0.5    1.1    1.1     1.
 50.  *    0.3    0.2    0.6    0.6    0.7    0.9    1.2    1.3     1.    0.8    0.9    0.9    1.3    1.5    1.2    1.3
 0.6    1.3    1.2    1.2
 60.  *    0.1    0.1    0.4    0.5    0.7    0.9    1.1    1.3    1.2    0.8     1.     1.    1.2    1.4    1.3    1.1
 0.5    1.1    1.2    1.1
 70.  *    0.1    0.1    0.3    0.4    0.4    0.8     1.    1.1    1.1     1.    1.1    1.3    1.3    1.5    1.5    1.3
 0.4    1.4    1.3    1.2
 80.  *    0.1    0.1    0.3    0.4    0.4    0.6    0.8     1.     1.    1.2     1.    1.2    1.6    1.5    1.3    1.2
 0.3    1.6    1.5    1.5
 90.  *    0.1    0.1    0.2    0.4    0.4    0.5    0.6    0.8    0.8    0.9    0.9     1.    1.3    1.3    1.2     1.
 0.2    1.5    1.4    1.4
100.  *     0.     0.    0.1    0.3    0.3    0.4    0.7    0.7    0.6    0.7    0.7    0.6    0.7    0.7    0.6    0.3
0.1    0.8    0.5    0.5
110.  *     0.     0.     0.    0.3    0.3    0.4    0.5    0.6    0.5    0.5    0.4    0.5    0.5    0.3     0.     0.
0.    0.1    0.1    0.1
120.  *     0.     0.     0.    0.2    0.3    0.3    0.5    0.6    0.6    0.5    0.4    0.4    0.3    0.3    0.1     0.
0.     0.     0.     0.
130.  *     0.     0.     0.    0.2    0.3    0.3    0.4    0.5    0.6    0.5    0.5    0.3    0.3    0.2    0.1     0.
0.     0.     0.     0.
140.  *     0.     0.     0.    0.1    0.3    0.3    0.5    0.5    0.6    0.5    0.5    0.2    0.1    0.1     0.     0.
0.     0.     0.     0.
150.  *     0.     0.     0.    0.1    0.2    0.4    0.5    0.5    0.5    0.5    0.4    0.1    0.1     0.     0.     0.
0.     0.     0.     0.
160.  *     0.     0.     0.    0.1    0.2    0.2    0.4    0.4    0.5    0.4    0.2    0.1     0.     0.     0.     0.
0.1     0.     0.     0.
170.  *     0.     0.     0.    0.1    0.2    0.2    0.3    0.3    0.3    0.2    0.1     0.     0.     0.     0.     0.
0.1     0.     0.     0.
180.  *     0.     0.     0.    0.1    0.1    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.
0.3     0.     0.     0.
190.  *     0.     0.     0.     0.    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.
0.6     0.     0.     0.
```

```
200.  *     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.     0.     0.     0.     0.     0.     0.
0.6     0.     0.     0.
210.  *     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.     0.     0.     0.     0.     0.
0.8     0.     0.     0.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.8     0.     0.     0.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.8     0.     0.     0.
240.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.7     0.     0.     0.
250.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.     0.     0.
0.7     0.     0.     0.
260.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.
0.7     0.     0.     0.
270.  *    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.4    0.6    0.4    0.1    0.1
0.7    0.1    0.1     0.
280.  *    0.2    0.2     0.     0.     0.     0.     0.     0.     0.1    0.2    0.8    0.9    1.1    0.9    0.4    0.3
0.7    0.2    0.2    0.1
290.  *    0.3    0.2     0.     0.     0.     0.     0.1    0.2    0.4    0.6    1.1    1.4    1.5    1.3    0.7    0.4
1.    0.4    0.3    0.2
300.  *    0.4    0.2     0.     0.     0.1    0.1    0.4    0.4    0.7    0.9    1.2    1.5    1.5    1.5     1.    0.7
1.2    0.5    0.3    0.2
310.  *    0.6    0.6    0.2    0.3    0.3    0.3    0.4    0.6    0.7     1.    1.2    1.5    1.6    1.6    1.1    0.9
1.3    0.7    0.4    0.3
320.  *    0.7    0.6    0.4    0.4    0.4    0.4    0.5    0.6    0.8     1.    1.2    1.5    1.5    1.5    1.2    0.9
1.4    0.9    0.4    0.3
330.  *    0.8    0.7    0.4    0.4    0.4    0.4    0.6    0.5    0.7    0.8     1.    1.2    1.4    1.4    1.2     1.
1.3    0.9    0.6    0.3
340.  *    0.9    0.9    0.5    0.5    0.5    0.5    0.8    0.8    0.8    0.8    0.9    1.1    1.2    1.2    1.1     1.
1.1    0.9    0.5    0.3
350.  *    0.7    0.7    0.7    0.8    0.7    0.7    0.7    0.7    0.7    0.8    0.9    1.2    1.2    1.2    1.1     1.
0.8    0.9    0.7    0.4
360.  *    0.6    0.5    0.9    0.9    0.9    0.7    0.7    0.6     1.    0.9    1.2    1.3    1.4    1.4    1.2     1.
0.7    0.9    0.9    0.4

------*-------------------------------------------------------------------------------------------------------------------
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MAX   *    0.9    0.9    0.9     1.     1.    1.2    1.2    1.3    1.2    1.2    1.2    1.5    1.6    1.6    1.5    1.3
1.4    1.6    1.5    1.5
DEGR. *    340    340      0     10     20     20     50     50     60     80      0    300     80     40     70     50
```

320 80 80 80

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88
.	0.3	0.3	0.1	0.	0.	0.	0.	0.
10.	0.4	0.3	0.2	0.	0.	0.	0.	0.
20.	0.6	0.4	0.2	0.	0.	0.	0.1	0.1
30.	0.6	0.5	0.5	0.1	0.1	0.1	0.1	0.1
40.	0.9	0.7	0.5	0.1	0.1	0.1	0.1	0.1
50.	1.1	0.9	0.7	0.1	0.1	0.1	0.1	0.2
60.	1.	0.9	0.8	0.1	0.1	0.1	0.1	0.2
70.	1.2	1.1	1.1	0.	0.	0.1	0.2	0.2
80.	1.5	1.4	1.4	0.1	0.1	0.2	0.2	0.2
90.	1.4	1.3	1.2	0.4	0.5	0.6	0.8	0.8
100.	0.5	0.4	0.4	1.1	1.2	1.3	1.4	1.5
110.	0.1	0.1	0.1	1.	1.	1.3	1.6	1.7
120.	0.	0.	0.	0.8	0.8	1.1	1.1	1.2
130.	0.	0.	0.	0.7	0.8	1.	1.1	1.2
140.	0.	0.	0.	0.5	0.6	0.9	1.	1.1
150.	0.	0.	0.	0.2	0.4	0.5	0.8	1.
160.	0.	0.	0.	0.2	0.2	0.4	0.6	0.9
170.	0.	0.	0.	0.2	0.2	0.2	0.6	0.8
180.	0.	0.	0.	0.1	0.2	0.2	0.3	0.8
190.	0.	0.	0.	0.	0.1	0.2	0.3	0.6
200.	0.	0.	0.	0.	0.1	0.2	0.2	0.4
210.	0.	0.	0.	0.	0.	0.1	0.2	0.4
220.	0.	0.	0.	0.	0.	0.1	0.1	0.3

230.	*	0.	0.	0.	0.	0.	0.	0.1	0.2
240.	*	0.	0.	0.	0.	0.	0.	0.	0.2
250.	*	0.	0.	0.	0.	0.	0.	0.	0.1
260.	*	0.	0.	0.	0.	0.	0.	0.	0.
270.	*	0.	0.	0.	0.	0.	0.	0.	0.
280.	*	0.1	0.	0.	0.	0.	0.	0.	0.
290.	*	0.1	0.	0.	0.	0.	0.	0.	0.
300.	*	0.2	0.	0.	0.	0.	0.	0.	0.
310.	*	0.2	0.1	0.	0.	0.	0.	0.	0.
320.	*	0.3	0.1	0.	0.	0.	0.	0.	0.
330.	*	0.3	0.1	0.	0.	0.	0.	0.	0.
340.	*	0.3	0.2	0.	0.	0.	0.	0.	0.
350.	*	0.3	0.2	0.1	0.	0.	0.	0.	0.
360.	*	0.3	0.3	0.1	0.	0.	0.	0.	0.
MAX	*	1.5	1.4	1.4	1.1	1.2	1.3	1.6	1.7
DEGR.	*	80	80	80	100	100	100	110	110

THE HIGHEST CONCENTRATION OF 1.70 ppm OCCURRED AT RECEPTOR REC88.

FF

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*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/7/2012 3:35:58 PM
** File: F:\2975 FirstLight\Microscale\Worst\49 Rte 44 & Orchard LOS&ADT\2022ASA.ou2
**
*********************************************
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: FirstLight-Taunton-Rte 44 & Orchard St- Build A Saturday RUN: CAL3QHC RUN

DATE : 12/ 7/12
TIME : 15:35:57

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE
VPH EF H W V/C QUEUE	*	X1	Y1	X2	Y2	*	(M)		
	*	(DEG)	(G/MI)	(M)	(M)	(VEH)			
1. EBTL	*	238118.14	850750.62	238199.34	850742.50	*	82.	96.	AG
1320. 8.5 0.0 13.4									
2. EBTLQ	*	238199.34	850742.50	238135.86	850748.88	*	64.	276.	AG
119. 100.0 0.0 7.4 0.77 10.6									
3. EBRL	*	238167.22	850742.50	238197.22	850740.06	*	30.	95.	AG

293. 8.5 0.0 9.0
4. EBRLQ * 238197.22 850740.06 238168.98 850742.38 * 28. 275. AG
59. 100.0 0.0 3.0 0.34 4.7
5. WBLT * 238300.23 850741.88 238230.86 850748.50 * 70. 275. AG
1352. 8.5 0.0 13.4
6. WBLTQ * 238230.86 850748.50 238383.89 850733.88 * 154. 95. AG
144. 100.0 0.0 7.4 1.02 25.6
7. WBRL * 238299.03 850746.69 238231.45 850754.00 * 68. 276. AG
142. 8.5 0.0 9.4
8. WBRLQ * 238231.45 850754.00 238244.62 850752.56 * 13. 96. AG
57. 100.0 0.0 3.4 0.16 2.2
9. NBLL * 238225.09 850675.19 238217.52 850730.06 * 55. 352. AG
307. 8.5 0.0 9.7
10. NBLLQ * 238217.52 850730.06 238223.33 850688.00 * 42. 172. AG
85. 100.0 0.0 3.7 0.67 7.1
11. NBTR * 238229.05 850675.50 238221.16 850730.06 * 55. 352. AG
152. 8.5 0.0 10.0
12. NBTRQ * 238221.16 850730.06 238224.70 850705.50 * 25. 172. AG
100. 100.0 0.0 4.0 0.64 4.1
13. SBLL * 238200.86 850837.00 238209.34 850762.75 * 75. 173. AG
161. 8.5 0.0 9.7
14. SBLLQ * 238209.34 850762.75 238206.45 850788.06 * 25. 353. AG
97. 100.0 0.0 3.7 0.60 4.2
15. SBTR * 238200.25 850836.69 238204.80 850763.69 * 73. 176. AG
218. 8.5 0.0 9.7
16. SBTRQ * 238204.80 850763.69 238186.61 851055.75 * 293. 356. AG
106. 100.0 0.0 3.7 1.54 48.8
17. EBOUT * 238232.06 850738.25 238299.34 850731.56 * 68. 96. AG
1468. 8.5 0.0 13.4
18. WBOUT * 238198.44 850754.25 238133.30 850759.44 * 65. 275. AG
1766. 8.5 0.0 13.4
19. NBOUT * 238213.58 850762.50 238204.19 850836.12 * 74. 353. AG
307. 8.5 0.0 9.4
20. SBOUT * 238209.64 850730.62 238221.16 850675.50 * 56. 168. AG
404. 8.5 0.0 9.0
21. EBL * 238199.95 850742.50 238213.77 850761.88 * 24. 35. AG
76. 9.4 0.0 9.0
22. EBT * 238199.77 850742.12 238231.58 850738.50 * 32. 97. AG
1244. 8.5 0.0 12.0
23. EBR * 238197.95 850740.06 238209.58 850731.88 * 14. 125. AG

293. 10.3 0.0 9.0
24. WBL * 238229.97 850749.00 238209.77 850732.31 * 26. 230. AG
33. 9.4 0.0 9.0
25. WBT * 238230.06 850748.75 238197.77 850754.25 * 33. 280. AG
1319. 8.5 0.0 12.0
26. WBR * 238230.81 850753.88 238213.69 850760.75 * 18. 292. AG
142. 10.3 0.0 9.0
27. NBL * 238217.69 850731.38 238199.09 850754.06 * 29. 321. AG
307. 9.4 0.0 9.0
28. NBT * 238221.11 850730.94 238214.62 850761.75 * 31. 348. AG
89. 8.5 0.0 9.0
29. NBR * 238221.39 850730.06 238232.73 850737.88 * 14. 55. AG
63. 10.3 0.0 9.0
30. SBL * 238209.11 850762.25 238229.58 850738.81 * 31. 139. AG
161. 9.4 0.0 9.0
31. SBT * 238205.02 850763.12 238209.02 850733.38 * 30. 172. AG
78. 8.5 0.0 9.0
32. SBR * 238204.53 850762.81 238192.25 850754.06 * 15. 235. AG
140. 10.3 0.0 9.0

FF

JOB: FirstLight-Taunton-Rte 44 & Orchard St- Build A Saturday RUN: CAL3QHC
RUN

DATE : 12/ 7/12
TIME : 15:35:57

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. EBTLQ	*	120	58	6.0	1320	1900	45.89	3	3
4. EBRLQ	*	120	58	6.0	293	1900	45.89	3	3
6. WBLTQ	*	120	70	6.0	1352	1900	45.89	3	3
8. WBRLQ	*	120	56	6.0	142	1900	45.89	3	3
10. NBLLQ	*	120	83	6.0	307	1900	45.89	3	3

12. NBTRQ	*	120	97	6.0	152	1900	45.89	3	3
14. SBLLQ	*	120	95	6.0	161	1900	45.89	3	3
16. SBTRQ	*	120	103	6.0	218	1900	45.89	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. R_001	*	238196.62	850836.38	1.8	*
2. R_002	*	238196.92	850831.56	1.8	*
3. R_003	*	238196.62	850826.12	1.8	*
4. R_004	*	238196.92	850820.31	1.8	*
5. R_005	*	238196.92	850814.25	1.8	*
6. R_006	*	238197.52	850809.12	1.8	*
7. R_007	*	238199.05	850801.56	1.8	*
8. R_008	*	238198.44	850795.50	1.8	*
9. R_009	*	238199.95	850788.25	1.8	*
10. R_010	*	238201.45	850782.44	1.8	*
11. R_011	*	238201.77	850776.12	1.8	*
12. R_012	*	238200.25	850770.62	1.8	*
13. R_013	*	238196.92	850764.88	1.8	*
14. R_014	*	238191.77	850762.19	1.8	*
15. R_015	*	238184.80	850761.56	1.8	*
16. R_016	*	238176.62	850761.56	1.8	*
17. R_017	*	238169.66	850762.19	1.8	*
18. R_018	*	238161.77	850763.38	1.8	*
19. R_019	*	238155.41	850764.88	1.8	*
20. R_020	*	238208.12	850837.00	1.8	*
21. R_021	*	238207.22	850832.19	1.8	*
22. R_022	*	238208.44	850824.88	1.8	*
23. R_023	*	238209.34	850820.94	1.8	*
24. R_024	*	238209.95	850814.88	1.8	*
25. R_025	*	238210.55	850807.31	1.8	*
26. R_026	*	238210.86	850800.62	1.8	*
27. R_027	*	238211.77	850794.56	1.8	*

FF

JOB: FirstLight-Taunton-Rte 44 & Orchard St- Build A Saturday RUN: CAL3QHC
RUN

RECEPTOR	COORDINATES (M) X	Y	Z
28. R_028	238212.98	850785.50	1.8
29. R_029	238214.48	850776.69	1.8
30. R_030	238216.61	850768.81	1.8
31. R_031	238220.86	850762.75	1.8
32. R_032	238225.41	850759.12	1.8
33. R_033	238232.38	850757.62	1.8
34. R_034	238239.95	850756.69	1.8
35. R_035	238249.64	850756.44	1.8
36. R_036	238257.22	850755.19	1.8
37. R_037	238266.31	850754.56	1.8
38. R_038	238274.19	850754.25	1.8
39. R_039	238282.38	850754.00	1.8
40. R_040	238289.34	850753.38	1.8
41. R_041	238295.41	850753.38	1.8
42. R_042	238299.64	850752.75	1.8
43. R_043	238299.34	850724.56	1.8
44. R_044	238292.06	850725.50	1.8
45. R_045	238284.19	850726.44	1.8
46. R_046	238275.70	850727.31	1.8
47. R_047	238267.81	850728.25	1.8
48. R_048	238261.16	850729.44	1.8
49. R_049	238254.48	850730.62	1.8
50. R_050	238247.81	850731.56	1.8
51. R_051	238240.55	850731.88	1.8
52. R_052	238234.48	850730.94	1.8
53. R_053	238229.95	850728.25	1.8
54. R_054	238227.52	850725.19	1.8
55. R_055	238226.31	850719.12	1.8
56. R_056	238226.92	850712.19	1.8
57. R_057	238228.44	850700.38	1.8
58. R_058	238229.05	850695.50	1.8
59. R_059	238229.95	850690.06	1.8
60. R_060	238230.55	850685.19	1.8
61. R_061	238231.16	850680.06	1.8
62. R_062	238232.06	850675.50	1.8
63. R_063	238217.52	850675.50	1.8
64. R_064	238216.61	850680.62	1.8

65. R_065	*	238215.09	850687.00	1.8 *
66. R_066	*	238213.89	850695.19	1.8 *
67. R_067	*	238212.98	850704.31	1.8 *
68. R_068	*	238211.45	850710.94	1.8 *
69. R_069	*	238208.73	850719.75	1.8 *
70. R_070	*	238205.70	850726.12	1.8 *
71. R_071	*	238202.06	850731.56	1.8 *
72. R_072	*	238194.80	850734.88	1.8 *
73. R_073	*	238186.92	850736.44	1.8 *
74. R_074	*	238179.95	850737.00	1.8 *
75. R_075	*	238171.77	850736.12	1.8 *
76. R_076	*	238164.50	850735.19	1.8 *
77. R_077	*	238227.22	850707.00	1.8 *
78. R_078	*	238146.92	850739.44	1.8 *
79. R_079	*	238138.44	850740.06	1.8 *

FF

JOB: FirstLight-Taunton-Rte 44 & Orchard St- Build A Saturday RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
80. R_080	*	238132.08	850740.38	1.8 *
81. R_081	*	238126.62	850741.56	1.8 *
82. R_082	*	238121.17	850741.88	1.8 *
83. R_083	*	238117.23	850741.88	1.8 *
84. R_084	*	238117.53	850767.94	1.8 *
85. R_085	*	238122.08	850768.25	1.8 *
86. R_086	*	238127.83	850767.00	1.8 *
87. R_087	*	238131.77	850766.38	1.8 *
88. R_088	*	238135.11	850766.12	1.8 *

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
	* REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
REC17	REC18	REC19	REC20													
.	* 0.5	0.5	0.4	0.5	0.5	0.5	0.6	0.5	0.6	1.1	1.	0.6	0.3	0.2	0.1	0.1
0.1	0.	0.	0.2													
10.	* 0.5	0.5	0.6	0.6	0.6	0.6	0.9	0.8	0.9	1.1	1.2	0.9	0.4	0.2	0.2	0.1
0.1	0.1	0.1	0.1													
20.	* 0.5	0.5	0.5	0.5	0.6	0.7	0.8	0.7	0.8	1.	1.	0.9	0.6	0.2	0.2	0.1
0.1	0.1	0.1	0.													
30.	* 0.4	0.4	0.5	0.7	0.7	0.7	0.8	0.7	0.8	1.	1.	0.8	0.6	0.3	0.2	0.1
0.1	0.1	0.1	0.													
40.	* 0.4	0.5	0.5	0.7	0.5	0.5	0.7	0.6	0.7	0.9	1.	0.8	0.7	0.3	0.2	0.2
0.2	0.1	0.1	0.													
50.	* 0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.8	0.8	0.7	0.6	0.3	0.3	0.2
0.2	0.2	0.1	0.													
60.	* 0.3	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.8	0.7	0.5	0.3	0.3	0.3
0.3	0.2	0.1	0.													
70.	* 0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.8	0.7	0.3	0.2	0.3	0.3
0.3	0.2	0.2	0.													
80.	* 0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.8	0.8	0.7	0.3	0.2	0.3	0.4
0.5	0.4	0.2	0.													
90.	* 0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.8	0.8	0.8	0.4	0.6	0.6	0.7
0.7	0.7	0.6	0.													
100.	* 0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.9	1.	1.	0.8	0.8	1.	1.2
1.2	1.2	0.9	0.													
110.	* 0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.9	1.2	1.2	1.1	0.8	1.1	1.2	1.2
1.3	1.4	1.4	0.													
120.	* 0.6	0.7	0.7	0.6	0.6	0.7	0.8	0.9	1.2	1.3	1.3	1.3	0.7	0.9	1.2	1.1
1.2	1.2	1.2	0.1													
130.	* 0.8	0.8	0.8	0.9	0.9	0.9	1.	0.9	1.2	1.4	1.3	1.1	0.7	1.	1.	1.1
1.2	1.1	1.1	0.1													
140.	* 1.	1.	1.	1.	1.	1.	1.1	1.2	1.4	1.5	1.3	0.9	0.6	0.8	1.	1.2
1.1	1.1	1.	0.2													
150.	* 1.1	1.1	1.	1.	1.1	1.2	1.3	1.3	1.3	1.3	1.1	0.6	0.9	1.1	1.	1.

```
 1.     1.    0.9    0.3
 160.  *    0.8    0.8    0.9    0.9    0.9     1.    1.2    0.9    0.9    1.1    1.1    0.6    0.6    0.9     1.     1.
 1.    0.9    0.9    0.4
 170.  *    0.7    0.8    0.9    0.7    0.7    0.7    0.8    0.7    0.7    0.9    0.8    0.4    0.8    0.8     1.     1.
 1.    0.9    0.8    0.2
 180.  *    0.6    0.6    0.4    0.4    0.4    0.5    0.7    0.6    0.8    0.8    0.8    0.6    0.7     1.     1.     1.
 0.9    0.9    0.9    0.4
 190.  *    0.5    0.5    0.4    0.4    0.4    0.4    0.5    0.3    0.5    0.7    0.6    0.5    0.7     1.     1.     1.
 0.9    0.9    0.9    0.8
 200.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.5    0.5    0.7    0.9     1.     1.    0.9
 0.9    0.9    0.8    0.9
 210.  *    0.2    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.6    0.9     1.    0.9    0.9
 0.9    0.9    0.9    0.9
 220.  *    0.1    0.2    0.2    0.2    0.3    0.3    0.4    0.4    0.4    0.4    0.6    0.7    0.8    0.9    0.9    0.9
 0.9    0.9    0.9    0.7

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.1    1.1     1.     1.    1.1    1.2    1.3    1.3    1.4    1.5    1.3    1.3    0.9    1.1    1.2    1.2
 1.3    1.4    1.4    0.9
 DEGR. *    150    150    140    140    150    150    150    150    140    140    120    120    150    110    110    100
 110    110    110    200
```

FF PAGE 5

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

```
 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC1   REC2   REC3   REC4   REC5   REC6   REC7   REC8   REC9   REC10  REC11  REC12  REC13  REC14  REC15  REC16
 REC17  REC18  REC19  REC20

 ------*-------------------------------------------------------------------------------------------------------------------
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230.  *     0.     0.     0.    0.1    0.2    0.2    0.3    0.4    0.4    0.4    0.6    0.8    0.9     1.    1.1    1.1
1.1     1.    0.8    0.4
240.  *     0.     0.     0.     0.     0.     0.     0.2    0.2    0.4    0.4    0.6    0.7    0.9     1.    1.2    1.2
1.2    0.9    0.9    0.4
250.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.4    0.6    0.8    1.1    1.1    1.1
1.    0.9    0.6    0.3
260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.4    0.7     1.    1.1    1.1
0.9    0.7    0.6    0.2
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.4    0.7    0.8    0.8
0.7    0.5    0.4    0.2
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.5    0.5
0.5    0.4    0.2    0.2
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3
0.3    0.2    0.1    0.2
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1
0.1    0.1    0.1    0.2
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1
0.1    0.1     0.    0.2
320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1
0.1    0.1     0.    0.3
330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1     0.     0.     0.     0.     0.1
0.1     0.     0.    0.3
340.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.3    0.1     0.     0.     0.     0.
0.     0.     0.    0.3
350.  *    0.3    0.3    0.3    0.3    0.2    0.4    0.4    0.4    0.4    0.6    0.6    0.4    0.2    0.1     0.     0.     0.
0.     0.     0.    0.3
360.  *    0.5    0.5    0.4    0.5    0.5    0.5    0.6    0.5    0.6    1.1     1.    0.6    0.3    0.2    0.1    0.1    0.1
0.1     0.     0.    0.2

------*-------------------------------------------------------------------------------------------------------------------
---------------------
MAX   *    1.1    1.1     1.     1.    1.1    1.2    1.3    1.3    1.4    1.5    1.3    1.3    0.9    1.1    1.2    1.2
1.3    1.4    1.4    0.9
DEGR. *    150    150    140    140    150    150    150    150    140    140    120    120    150    110    110    100
110    110    110    200

      MODEL RESULTS
      -------------
```

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
.	* 0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.
10.	* 0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20.	* 0.	0.	0.	0.	0.	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
40.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MAX	* 0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.
DEGR.	* 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND * CONCENTRATION
ANGLE * (PPM)

WIND ANGLE (DEGR)	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36	REC37	REC38	REC39	REC40
50.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
60.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
70.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
80.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.	0.	0.	0.	0.	0.
90.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.3	0.5	0.4	0.3	0.3	0.3	0.1	0.1	0.1
100.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.3	0.6	0.9	1.	0.9	0.7	0.7	0.6	0.4	0.4	0.3
110.	0.	0.	0.	0.	0.1	0.1	0.1	0.2	0.4	0.6	0.9	1.3	1.4	1.1	1.1	1.1	1.	0.7	0.5	0.5
120.	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.5	0.7	0.9	1.1	1.5	1.4	1.2	1.2	1.1	0.9	0.6	0.5
130.	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.6	0.6	0.9	1.2	1.4	1.3	1.1	1.1	1.1	1.	0.8	0.6
140.	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.6	0.8	1.	1.3	1.2	1.2	1.2	1.1	1.	0.8	0.6
150.	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.7	0.8	1.1	1.2	1.	1.	1.	0.9	0.8	0.7
160.	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.4	0.4	0.6	0.7	1.	1.1	0.8	0.9	0.9	0.8	0.8	0.7
170.	0.3	0.4	0.4	0.4	0.5	0.5	0.4	0.3	0.5	0.5	0.6	0.7	1.	1.1	0.8	0.9	0.8	0.8	0.8	0.8
180.	0.8	0.7	0.5	0.6	0.6	0.7	0.7	0.4	0.5	0.5	0.7	0.7	0.8	1.1	0.8	0.8	0.8	0.8	0.8	0.8
190.	0.8	0.9	0.8	0.9	0.9	0.9	0.8	0.6	0.5	0.4	0.6	0.7	1.	1.	0.8	0.8	0.8	0.8	0.8	0.8

```
200.  *    0.9    0.9    0.9    0.9    0.9    0.9    1.1    0.9    0.6    0.4    0.6    0.6    0.9    1.2    0.8    0.8
0.8    0.8    0.8    0.8
210.  *    0.9    0.9    0.9    0.9    0.9    0.9     1.    1.1    0.8    0.6    0.6    0.5    0.5    1.2     1.    0.9
0.9    0.8    0.8    0.8
220.  *    0.8    0.8    0.7    0.7    0.8    0.9     1.    1.2    0.8    0.7    0.6    0.5    0.5     1.    1.2    1.2
1.    0.9    0.8    0.8
230.  *    0.5    0.5    0.6    0.6    0.7    0.7    0.9     1.     1.    0.8    0.7    0.7    0.5     1.    0.9    1.1
1.     1.     1.     1.
240.  *    0.4    0.4    0.4    0.4    0.5    0.6    0.7    0.9    1.1     1.    0.8    0.9    0.8     1.    1.1    1.1
1.2    1.1    1.1    1.1
250.  *    0.4    0.4    0.4    0.4    0.4    0.5    0.4    0.8    0.9     1.    0.8     1.     1.     1.    1.2    1.3
1.2    1.2    1.2    1.1
260.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.6    0.8    0.9    0.7    1.1     1.    1.1    1.1    1.2
1.2    1.3    1.3    1.4
270.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.5    0.6    0.7    0.7    0.8    0.7    0.6    0.8    0.9
0.9     1.    0.9    0.9
280.  *    0.4    0.4    0.4    0.3    0.3    0.4    0.3    0.5    0.5    0.6    0.4    0.6    0.5    0.4    0.3    0.4
0.4    0.4    0.3    0.3
290.  *    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.3    0.4    0.4    0.3    0.2    0.1
0.1    0.1     0.     0.
300.  *    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.4    0.2    0.2    0.2    0.2    0.1
0.1    0.1    0.1    0.1
310.  *    0.4    0.5    0.4    0.4    0.5    0.5    0.5    0.5    0.7    0.5    0.5    0.3    0.2    0.2    0.1    0.1
0.1    0.1    0.1    0.1
320.  *    0.4    0.4    0.5    0.6    0.6    0.6    0.5    0.5    0.7    0.7    0.5    0.4    0.3    0.1    0.1    0.1
0.1    0.1    0.1    0.1
330.  *    0.4    0.4    0.4    0.5    0.6    0.6    0.6    0.7    0.8    0.8    0.4    0.4    0.2    0.1    0.1    0.1
0.1    0.1    0.1    0.1
340.  *    0.4    0.4    0.4    0.4    0.6    0.7    0.7    0.7    0.8    0.7    0.4    0.3    0.1    0.1    0.1    0.1
0.1    0.1     0.     0.
350.  *    0.3    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.5    0.4    0.3    0.1    0.1    0.1    0.1     0.
0.     0.     0.     0.
360.  *    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.1    0.1     0.     0.     0.     0.
0.     0.     0.     0.

------*-------------------------------------------------------------------------------------------------------------
--------------------
MAX   *    0.9    0.9    0.9    0.9    0.9    0.9    1.1    1.2    1.1     1.    0.9    1.3    1.5    1.4    1.2    1.3
1.2    1.3    1.3    1.4
DEGR. *    200    190    200    190    190    190    200    220    240    240    110    110    120    120    120    250
```

240 260 260 260

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	*	0.	0.	0.5	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.8	0.8	0.7	0.6	0.4	0.4	0.8	0.7	0.6	0.6
10.	*	0.	0.	0.4	0.8	0.8	0.8	0.8	0.9	0.9	1.	0.9	0.8	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.3
20.	*	0.	0.	0.3	0.8	0.8	0.8	0.8	0.9	0.9	1.	0.9	0.8	0.7	0.7	0.4	0.3	0.3	0.3	0.3	0.3
30.	*	0.	0.	0.2	0.7	0.8	0.8	0.8	1.	1.	1.	1.	0.8	0.7	0.7	0.6	0.4	0.3	0.3	0.3	0.3
40.	*	0.	0.	0.3	0.7	0.9	0.9	1.	1.	1.	1.	1.1	0.9	0.7	0.7	0.6	0.5	0.4	0.3	0.3	0.3
50.	*	0.	0.	0.3	0.6	0.8	1.	1.	1.1	1.1	1.1	1.1	1.1	0.8	0.7	0.6	0.5	0.4	0.3	0.3	0.3
60.	*	0.	0.	0.3	0.5	0.8	0.9	1.	1.	1.2	1.2	1.2	1.1	0.9	0.7	0.7	0.5	0.3	0.3	0.2	0.2
70.	*	0.	0.	0.3	0.5	0.7	0.9	0.9	1.1	1.1	1.2	1.2	1.1	1.	0.8	0.5	0.5	0.2	0.2	0.1	0.1
80.	*	0.	0.	0.2	0.4	0.6	0.7	0.9	1.	1.	1.2	1.2	1.1	0.8	0.6	0.5	0.2	0.1	0.1	0.	0.
90.	*	0.1	0.1	0.1	0.2	0.5	0.6	0.7	0.7	0.9	1.	1.	0.8	0.6	0.3	0.2	0.1	0.	0.	0.	0.

```
100.  *    0.3    0.2     0.     0.1    0.3    0.3    0.4    0.5    0.6    0.6    0.6    0.4    0.2    0.1     0.     0.
0.     0.     0.     0.
110.  *    0.4    0.4     0.     0.     0.1    0.1    0.2    0.2    0.3    0.3    0.3    0.2     0.     0.     0.     0.
0.     0.     0.     0.
120.  *    0.4    0.4     0.     0.     0.1    0.1    0.1    0.1    0.1    0.2    0.1    0.1     0.     0.     0.     0.
0.     0.     0.     0.
130.  *    0.4    0.4     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
140.  *    0.5    0.4     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
150.  *    0.4    0.3     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
160.  *    0.6    0.4     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
170.  *    0.6    0.5     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.1
0.1    0.1     0.     0.
180.  *    0.8    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.4    0.5    0.4
0.2    0.1    0.1     0.
190.  *    0.8    0.7     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.6    0.8    0.7
0.3    0.2    0.2     0.
200.  *    0.8    0.8     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.5    0.8    0.9    0.8
0.4    0.2    0.2     0.
210.  *    0.8    0.8     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.4    0.6    0.8    0.9    0.8
0.5    0.4    0.2    0.1
220.  *    0.8    0.8     0.     0.     0.     0.     0.     0.     0.1    0.3    0.2    0.5    0.6    0.7    0.8    0.7
0.4    0.3    0.2    0.1
230.  *    0.9     1.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.2    0.3    0.5    0.7    0.7    0.7
0.4    0.4    0.2    0.2
240.  *     1.     1.     0.     0.     0.1    0.1    0.1    0.2    0.3    0.3    0.3    0.3    0.5    0.7    0.7    0.7
0.4    0.4    0.2    0.2
250.  *    1.1    1.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.3    0.2    0.5    0.7    0.7    0.7
0.4    0.4    0.3    0.2
260.  *    1.2    1.2    0.1    0.2    0.2    0.1    0.3    0.4    0.4    0.5    0.4    0.2    0.4    0.7    0.7    0.7
0.4    0.4    0.3    0.2
270.  *    0.9     1.    0.3    0.4    0.4    0.6    0.6    0.6    0.7    0.7    0.7    0.4    0.5    0.7    0.7    0.7
0.4    0.4    0.4    0.2
280.  *    0.3    0.3    1.1    1.1    1.2    1.1     1.     1.    1.1     1.     1.    0.7    0.7    0.8    0.9    0.8
0.4    0.4    0.4    0.2
290.  *     0.     0.    1.2    1.2    1.4    1.3    1.3    1.2    1.2    1.1    1.1    1.1     1.     1.    1.1     1.
0.5    0.4    0.4    0.3
```

```
 300.  *    0.1    0.1    1.2     1.     1.    1.1    1.3    1.2     1.    1.2     1.     1.    0.9    1.1    1.2    1.2
 0.7    0.7    0.7    0.4
 310.  *    0.1    0.1    1.2    1.2    1.2    1.2     1.    1.1    1.1     1.    0.9    0.7    0.7    0.9    1.2    1.4
 0.9    0.8    0.8    0.8
 320.  *    0.1    0.1    1.1    1.2    1.2    1.2    1.2    1.1     1.     1.    1.1    0.7    0.7    0.6    1.3    1.3
 1.    0.9    0.8    0.8
 330.  *    0.1    0.1     1.     1.     1.     1.     1.    1.1    1.1    0.9    0.9    0.8    0.7    0.6     1.    1.1
 1.1    1.1     1.    0.9
 340.  *     0.     0.    0.7    0.8    0.9    0.9    0.9     1.    1.1     1.     1.    0.8    0.7    0.6    0.6    1.1
 1.    0.9    0.8    0.8
 350.  *     0.     0.    0.7    0.8    0.8    0.8    0.8    0.9     1.     1.    0.9    0.8    0.5    0.5    0.5    0.6
 0.8    0.8    0.7    0.7
 360.  *     0.     0.    0.5    0.8    0.8    0.8    0.8    0.9    0.9    0.9    0.8    0.8    0.7    0.6    0.4    0.4
 0.8    0.7    0.6    0.6

 ------*-------------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *    1.2    1.2    1.2    1.2    1.4    1.3    1.3    1.2    1.2    1.2    1.2    1.1     1.    1.1    1.3    1.4
 1.1    1.1     1.    0.9
 DEGR. *    260    260    290    290    290    290    290    290     60     60     60     50     70    300    320    310
 330    330    330    330
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
*	REC61	REC62	REC63	REC64	REC65	REC66	REC67	REC68	REC69	REC70	REC71	REC72	REC73	REC74	REC75	REC76
REC77	REC78	REC79	REC80													

```
   .  *    0.6    0.6    0.8    0.8    0.8    0.6    0.6    0.5    0.8    0.8    1.1    1.3    1.4    1.4    1.2     1.
   0.6    0.9    0.8    0.4
  10.  *    0.3    0.3    0.6    0.7    0.8    0.8    0.8    0.6    0.6    0.8     1.    1.3    1.5    1.4    1.2     1.
  0.5     1.     1.    0.6
  20.  *    0.3    0.3    0.8    0.9    0.9     1.     1.    0.7    0.4    0.6    0.8    1.2    1.3    1.3    1.2     1.
  0.3     1.     1.    0.8
  30.  *    0.3    0.3    0.6    0.7    0.9    0.8     1.     1.    0.4    0.7    0.7     1.    1.4    1.4    1.2    1.2
  0.4     1.     1.    0.9
  40.  *    0.3    0.3    0.5    0.6    0.7    0.8    0.9    0.9    0.8    0.7    0.7    0.8    1.2    1.5    1.2    1.2
  0.4    1.1    1.1     1.
  50.  *    0.2    0.2    0.5    0.6    0.7    0.8     1.    1.1    0.9    0.8    0.9    0.9    1.3    1.4    1.2    1.1
  0.5    1.2    1.1    1.1
  60.  *    0.1    0.1    0.3    0.4    0.6    0.7     1.    1.1    1.1    0.8    0.9     1.    1.1    1.4    1.2    1.1
  0.5    1.1    1.1     1.
  70.  *    0.1    0.1    0.3    0.3    0.4    0.6    0.8    1.1    0.9    0.9    1.1    1.1    1.3    1.5    1.4    1.3
  0.3    1.2    1.2    1.2
  80.  *     0.     0.    0.2    0.2    0.3    0.5    0.7    0.8    0.9    0.9    1.1    1.2    1.3    1.4    1.3    1.1
  0.2    1.4    1.4    1.4
  90.  *     0.     0.    0.1    0.2    0.3    0.4    0.5    0.6    0.8    0.8    0.7    0.9    1.1    1.1     1.    0.7
  0.    1.3    1.2    1.1
 100.  *     0.     0.     0.    0.2    0.2    0.4    0.4    0.5    0.4    0.5    0.6    0.6    0.6    0.6    0.4    0.3
 0.    0.6    0.5    0.5
 110.  *     0.     0.     0.    0.2    0.2    0.4    0.4    0.5    0.5    0.4    0.4    0.4    0.4    0.3    0.1     0.
 0.    0.1    0.1    0.1
 120.  *     0.     0.     0.    0.1    0.2    0.3    0.4    0.5    0.5    0.4    0.3    0.3    0.2    0.2    0.1     0.
 0.     0.     0.     0.
 130.  *     0.     0.     0.    0.1    0.2    0.4    0.4    0.4    0.6    0.6    0.4    0.3    0.2    0.1     0.     0.
 0.     0.     0.     0.
 140.  *     0.     0.     0.    0.1    0.2    0.3    0.5    0.5    0.6    0.5    0.4    0.2    0.2     0.     0.     0.
 0.     0.     0.     0.
 150.  *     0.     0.     0.    0.1    0.1    0.3    0.4    0.4    0.4    0.4    0.3    0.2     0.     0.     0.     0.
 0.     0.     0.     0.
 160.  *     0.     0.     0.    0.1    0.1    0.2    0.4    0.4    0.4    0.3    0.2     0.     0.     0.     0.     0.
 0.1    0.     0.     0.
 170.  *     0.     0.     0.    0.1    0.1    0.2    0.2    0.2    0.2    0.1    0.1     0.     0.     0.     0.     0.
 0.1    0.     0.     0.
 180.  *     0.     0.     0.    0.1    0.1    0.1    0.2    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.
 0.3    0.     0.     0.
 190.  *     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.
 0.4    0.     0.     0.
```

```
200.  *     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.     0.     0.     0.     0.     0.
0.5     0.     0.     0.
210.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.6     0.     0.     0.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.5     0.     0.     0.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.5     0.     0.     0.
240.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.6     0.     0.     0.
250.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.     0.     0.
0.6     0.     0.     0.
260.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.
0.7     0.     0.     0.
270.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.5    0.3    0.1    0.1
0.7    0.1    0.1     0.
280.  *    0.2    0.2     0.     0.     0.     0.     0.     0.     0.1    0.2    0.7    0.9    1.1    0.8    0.4    0.3
0.7    0.2    0.2    0.1
290.  *    0.2    0.2     0.     0.     0.     0.     0.1    0.2    0.4    0.5    1.1    1.3    1.4    1.2    0.7    0.4
1.    0.4    0.3    0.2
300.  *    0.3    0.2     0.     0.     0.1    0.1    0.3    0.4    0.5    0.8    1.2    1.5    1.5    1.3    0.9    0.7
1.1    0.5    0.3    0.2
310.  *    0.7    0.5    0.1    0.3    0.3    0.3    0.3    0.5    0.7    0.8    1.2    1.4    1.5    1.5    0.9    0.9
1.2    0.7    0.4    0.3
320.  *    0.7    0.7    0.3    0.3    0.3    0.3    0.4    0.6    0.7    0.7    1.2    1.4    1.4    1.4     1.    0.8
1.4    0.8    0.4    0.3
330.  *    0.8    0.7    0.4    0.4    0.4    0.4    0.4    0.4    0.6    0.8    0.9    1.2    1.4    1.4    1.2    0.9
1.2    0.9    0.6    0.3
340.  *    0.9    0.8    0.4    0.4    0.5    0.5    0.7    0.7    0.8    0.7     1.    1.1    1.2    1.2    1.1    0.9
1.1    0.9    0.5    0.3
350.  *    0.7    0.7    0.5    0.6    0.6    0.5    0.5    0.5    0.7    0.8    0.9    1.2    1.3    1.2    1.1    0.9
0.8    0.9    0.7    0.4
360.  *    0.6    0.6    0.8    0.8    0.8    0.6    0.6    0.5    0.8    0.8    1.1    1.3    1.4    1.4    1.2     1.
0.6    0.9    0.8    0.4

------*-------------------------------------------------------------------------------------------------------------
--------------------
MAX   *    0.9    0.8    0.8    0.9    0.9     1.     1.    1.1    1.1    0.9    1.2    1.5    1.5    1.5    1.4    1.3
1.4    1.4    1.4    1.4
DEGR. *    340    340      0     20     20     20     20     50     60     70    300    300     10     40     70     70
```

320 80 80 80

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88
.	0.3	0.3	0.1	0.	0.	0.	0.	0.
10.	0.4	0.3	0.2	0.	0.	0.	0.	0.
20.	0.6	0.5	0.3	0.1	0.1	0.1	0.1	0.1
30.	0.6	0.5	0.5	0.1	0.1	0.1	0.1	0.1
40.	0.9	0.7	0.5	0.1	0.1	0.1	0.1	0.1
50.	1.	0.9	0.7	0.1	0.1	0.1	0.1	0.1
60.	0.9	0.8	0.8	0.1	0.1	0.1	0.1	0.2
70.	1.1	1.	1.	0.	0.1	0.1	0.2	0.2
80.	1.3	1.1	1.1	0.1	0.1	0.1	0.2	0.2
90.	1.1	1.1	1.	0.3	0.4	0.4	0.5	0.5
100.	0.5	0.4	0.4	0.9	0.9	1.1	1.2	1.3
110.	0.1	0.1	0.1	0.9	1.	1.2	1.3	1.4
120.	0.	0.	0.	0.8	0.8	1.	1.	1.1
130.	0.	0.	0.	0.6	0.7	0.9	1.	1.1
140.	0.	0.	0.	0.5	0.4	0.8	1.	1.1
150.	0.	0.	0.	0.2	0.4	0.5	0.8	0.9
160.	0.	0.	0.	0.2	0.2	0.4	0.6	0.8
170.	0.	0.	0.	0.2	0.2	0.2	0.5	0.7
180.	0.	0.	0.	0.1	0.2	0.2	0.3	0.7
190.	0.	0.	0.	0.	0.1	0.2	0.2	0.5
200.	0.	0.	0.	0.	0.1	0.2	0.2	0.4
210.	0.	0.	0.	0.	0.	0.1	0.2	0.3
220.	0.	0.	0.	0.	0.	0.1	0.1	0.3

230.	*	0.	0.	0.	0.	0.	0.	0.1	0.2
240.	*	0.	0.	0.	0.	0.	0.	0.	0.2
250.	*	0.	0.	0.	0.	0.	0.	0.	0.1
260.	*	0.	0.	0.	0.	0.	0.	0.	0.
270.	*	0.	0.	0.	0.	0.	0.	0.	0.
280.	*	0.1	0.	0.	0.	0.	0.	0.	0.
290.	*	0.1	0.	0.	0.	0.	0.	0.	0.
300.	*	0.2	0.	0.	0.	0.	0.	0.	0.
310.	*	0.2	0.1	0.	0.	0.	0.	0.	0.
320.	*	0.3	0.1	0.	0.	0.	0.	0.	0.
330.	*	0.3	0.1	0.	0.	0.	0.	0.	0.
340.	*	0.3	0.2	0.	0.	0.	0.	0.	0.
350.	*	0.3	0.2	0.1	0.	0.	0.	0.	0.
360.	*	0.3	0.3	0.1	0.	0.	0.	0.	0.
MAX	*	1.3	1.1	1.1	0.9	1.	1.2	1.3	1.4
DEGR.	*	80	80	80	100	110	110	110	110

THE HIGHEST CONCENTRATION OF 1.50 ppm OCCURRED AT RECEPTOR REC73.

FF

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**********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/11/2012 11:23:57 AM
** File: F:\2975 FirstLight\Microscale\Worst\12 Hart & County LOS\2012EXAM.ou2
**
**********************************************


                    CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                    PAGE  1

     JOB: First Light - Taunton - Hart & County Sts -Existing AM                  RUN: CAL3QHC
     RUN

     DATE : 12/11/12
     TIME : 11:23:54

        The MODE flag has been set to C for calculating CO averages.

      SITE & METEOROLOGICAL VARIABLES
      -------------------------------
      VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 100. CM
       U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  0.0 PPM

      LINK VARIABLES
      --------------
                 LINK DESCRIPTION               *              LINK COORDINATES (M)              *    LENGTH  BRG TYPE
                 VPH    EF      H     W    V/C QUEUE
                                                *       X1          Y1            X2          Y2    *     (M)
                                               (DEG)            (G/MI)   (M)   (M)       (VEH)

     ------------------------------------------*-------------------------------------------------*------------------------
     ---------------------------------
      1. Hart EB TL                            *  235870.27    848335.69   235946.16    848348.19 *      77.    81. AG
      217.   8.7   0.0    9.4
      2. Hart EB TL QUEUE                      *  235946.16    848348.19   235914.22    848342.94 *      32.   261. AG
      108. 100.0   0.0    3.4 0.79   5.4
      3. Hart EB RL                            *  235910.48    848343.12   235945.62    848345.50 *      35.    86. AG
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 259.   8.7   0.0    9.0
 4. Hart EB RL QUEUE                  *  235945.62    848345.50   235897.98    848342.25 *      48.   266. AG
 108. 100.0   0.0    3.0 0.94   8.0
 5. Hart WB LT                        *  236039.62    848367.12   235970.39    848354.56 *      70.   260. AG
 212.   8.7   0.0    9.4
 6. Hart WB LT QUEUE                  *  235970.39    848354.56   236001.03    848360.12 *      31.    80. AG
 108. 100.0   0.0    3.4 0.77   5.2
 7. Hart WB RL                        *  236019.66    848365.25   235969.06    848357.75 *      51.   262. AG
 93.   8.7   0.0    9.0
 8. Hart WB RL QUEUE                  *  235969.06    848357.75   235982.56    848359.75 *      14.    82. AG
 108. 100.0   0.0    3.0 0.34   2.3
 9. 140 NB L                          *  235982.64    848282.94   235962.94    848336.75 *      57.   340. AG
 124.   8.7   0.0    9.4
10. 140 NB L QUEUE                    *  235962.94    848336.75   235967.62    848323.94 *      14.   160. AG
81. 100.0   0.0    3.4 0.19   2.3
11. 140 NB TRL                        *  235983.98    848285.06   235965.06    848337.00 *      55.   340. AG
654.   8.7   0.0    9.0
12. 140 NB TRL QUEUE                  *  235965.06    848337.00   235998.53    848245.12 *      98.   160. AG
81. 100.0   0.0    3.0 1.00  16.3
13. 140 SB LL                         *  235919.00    848421.94   235949.36    848359.12 *      70.   154. AG
89.   8.7   0.0    9.4
14. 140 SB LL QUEUE                   *  235949.36    848359.12   235944.91    848368.31 *      10.   334. AG
84. 100.0   0.0    3.4 0.15   1.7
15. 140 SB TR                         *  235919.53    848419.00   235945.62    848359.38 *      65.   156. AG
447.   8.7   0.0    9.4
16. 140 SB TR QUEUE                   *  235945.62    848359.38   235925.02    848406.44 *      51.   336. AG
84. 100.0   0.0    3.4 0.74   8.6
17. Hart EB OUTBOUND                  *  235965.73    848350.19   236039.41    848363.12 *      75.    80. AG
341.   8.7   0.0    9.4
18. Hart WB OUTBOUND                  *  235941.72    848352.06   235869.94    848338.81 *      73.   260. AG
255.   8.7   0.0    9.4
19. 140 NB OUTBOUND                   *  235952.52    848359.88   235923.64    848423.31 *      70.   336. AG
712.   8.7   0.0    9.4
20. 140 SB OUTBOUND                   *  235956.02    848338.31   235978.42    848283.25 *      59.   158. AG
787.   8.7   0.0    9.4
21. EBL                               *  235946.53    848348.12   235953.55    848359.31 *      13.    32. AG
36.   9.7   0.0    9.0
22. EBT                               *  235946.27    848348.31   235965.38    848350.44 *      19.    84. AG
181.   8.7   0.0    9.0
23. EBR                               *  235944.44    848346.44   235956.19    848338.50 *      14.   124. AG
```

259. 10.8 0.0 9.0
24. WBL * 235969.30 848354.88 235956.00 848339.56 * 20. 221. AG
93. 9.7 0.0 9.0
25. WBT * 235969.11 848354.62 235942.53 848351.69 * 27. 264. AG
119. 8.7 0.0 9.0
26. WBR * 235967.92 848357.19 235952.72 848359.31 * 15. 278. AG
93. 10.8 0.0 9.0
27. NBL * 235962.92 848337.50 235942.34 848352.00 * 25. 305. AG
124. 9.7 0.0 9.0
28. NBT * 235964.83 848337.69 235952.81 848359.44 * 25. 331. AG
583. 8.7 0.0 9.0
29. NBR * 235964.45 848338.56 235967.66 848350.31 * 12. 15. AG
71. 10.8 0.0 9.0
30. SBL * 235949.27 848359.25 235965.19 848350.25 * 18. 119. AG
89. 9.7 0.0 9.0
31. SBT * 235945.70 848359.44 235956.09 848338.94 * 23. 153. AG
435. 8.7 0.0 9.0
32. SBR * 235946.34 848359.62 235939.53 848350.81 * 11. 218. AG
12. 10.8 0.0 9.0

FF

JOB: First Light - Taunton - Hart & County Sts -Existing AM RUN: CAL3QHC
RUN

DATE : 12/11/12
TIME : 11:23:54

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Hart EB TL QUEUE	*	110	88	4.0	217	1900	50.22	2	3
4. Hart EB RL QUEUE	*	110	88	4.0	259	1900	50.22	2	3
6. Hart WB LT QUEUE	*	110	88	4.0	212	1900	50.22	2	3
8. Hart WB RL QUEUE	*	110	88	4.0	93	1900	50.22	2	3
10. 140 NB L QUEUE	*	110	66	4.0	124	1900	50.22	2	3

12. 140 NB TRL QUEUE	*	110	66	4.0	654	1900	50.22	2	3
14. 140 SB LL QUEUE	*	110	69	4.0	89	1900	50.22	2	3
16. 140 SB TR QUEUE	*	110	69	4.0	447	1900	50.22	2	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235961.95	848360.62	1.8	*
2. LR_2	*	235956.00	848363.88	1.8	*
3. LR_3	*	235953.88	848368.38	1.8	*
4. LR_4	*	235951.77	848372.94	1.8	*
5. LR_5	*	235949.66	848377.50	1.8	*
6. LR_6	*	235947.55	848382.00	1.8	*
7. LR_7	*	235945.42	848386.50	1.8	*
8. LR_8	*	235943.31	848391.06	1.8	*
9. LR_9	*	235941.19	848395.56	1.8	*
10. LR_10	*	235939.06	848400.12	1.8	*
11. LR_11	*	235936.95	848404.62	1.8	*
12. LR_12	*	235934.84	848409.19	1.8	*
13. LR_13	*	235932.73	848413.69	1.8	*
14. LR_14	*	235930.61	848418.25	1.8	*
15. LR_15	*	235928.50	848422.75	1.8	*
16. LR_16	*	235913.59	848419.25	1.8	*
17. LR_17	*	235915.72	848414.69	1.8	*
18. LR_18	*	235917.83	848410.19	1.8	*
19. LR_19	*	235919.95	848405.62	1.8	*
20. LR_20	*	235922.06	848401.12	1.8	*
21. LR_21	*	235924.19	848396.56	1.8	*
22. LR_22	*	235926.30	848392.06	1.8	*
23. LR_23	*	235928.41	848387.50	1.8	*
24. LR_24	*	235930.52	848383.00	1.8	*
25. LR_25	*	235932.64	848378.50	1.8	*
26. LR_26	*	235934.75	848373.94	1.8	*
27. LR_27	*	235936.88	848369.44	1.8	*
28. LR_28	*	235938.98	848364.88	1.8	*
29. LR_29	*	235941.09	848360.31	1.8	*
30. LR_31	*	235969.44	848342.38	1.8	*
31. LR_32	*	235970.98	848345.12	1.8	*

32. LR_33	*	235975.58	848347.31	1.8 *
33. LR_34	*	235980.50	848348.19	1.8 *
34. LR_35	*	235985.42	848349.12	1.8 *
35. LR_36	*	235990.34	848350.00	1.8 *
36. LR_37	*	235995.27	848350.94	1.8 *

FF

JOB: First Light - Taunton - Hart & County Sts -Existing AM RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
37. LR_38	*	236000.19	848351.81	1.8 *
38. LR_39	*	236005.09	848352.69	1.8 *
39. LR_40	*	236010.02	848353.62	1.8 *
40. LR_41	*	236014.94	848354.50	1.8 *
41. LR_42	*	236019.84	848355.38	1.8 *
42. LR_43	*	236024.77	848356.31	1.8 *
43. LR_44	*	236029.69	848357.19	1.8 *
44. LR_45	*	236034.61	848358.12	1.8 *
45. LR_46	*	236039.53	848359.00	1.8 *
46. LR_47	*	236041.47	848373.19	1.8 *
47. LR_48	*	236036.55	848372.31	1.8 *
48. LR_49	*	236031.62	848371.44	1.8 *
49. LR_50	*	236026.70	848370.50	1.8 *
50. LR_51	*	236021.80	848369.62	1.8 *
51. LR_52	*	236016.88	848368.69	1.8 *
52. LR_53	*	236011.95	848367.81	1.8 *
53. LR_54	*	236007.05	848366.94	1.8 *
54. LR_55	*	236002.12	848366.00	1.8 *
55. LR_56	*	235997.20	848365.12	1.8 *
56. LR_57	*	235992.28	848364.25	1.8 *
57. LR_58	*	235987.38	848363.31	1.8 *
58. LR_59	*	235982.45	848362.44	1.8 *
59. LR_60	*	235977.53	848361.50	1.8 *
60. LR_61	*	235972.61	848360.62	1.8 *
61. LR_62	*	235967.69	848359.75	1.8 *
62. LR_64	*	235938.45	848355.44	1.8 *
63. LR_65	*	235933.53	848354.56	1.8 *
64. LR_66	*	235928.59	848353.69	1.8 *

65. LR_67	*	235923.69	848352.88	1.8 *
66. LR_68	*	235918.75	848352.00	1.8 *
67. LR_69	*	235913.83	848351.12	1.8 *
68. LR_70	*	235908.91	848350.25	1.8 *
69. LR_71	*	235903.97	848349.44	1.8 *
70. LR_72	*	235899.05	848348.56	1.8 *
71. LR_73	*	235894.12	848347.69	1.8 *
72. LR_74	*	235889.20	848346.88	1.8 *
73. LR_75	*	235884.27	848346.00	1.8 *
74. LR_76	*	235879.34	848345.12	1.8 *
75. LR_77	*	235874.42	848344.25	1.8 *
76. LR_78	*	235869.48	848343.44	1.8 *
77. LR_79	*	235871.02	848332.75	1.8 *
78. LR_80	*	235875.95	848333.56	1.8 *
79. LR_81	*	235880.88	848334.44	1.8 *
80. LR_82	*	235885.80	848335.31	1.8 *
81. LR_83	*	235890.73	848336.12	1.8 *
82. LR_84	*	235895.66	848337.00	1.8 *
83. LR_85	*	235900.58	848337.88	1.8 *
84. LR_86	*	235905.50	848338.75	1.8 *
85. LR_87	*	235910.44	848339.56	1.8 *
86. LR_88	*	235915.36	848340.44	1.8 *
87. LR_89	*	235920.28	848341.31	1.8 *
88. LR_90	*	235925.38	848341.50	1.8 *
89. LR_91	*	235930.12	848341.56	1.8 *
90. LR_92	*	235935.22	848341.44	1.8 *
91. LR_93	*	235940.47	848342.31	1.8 *
92. LR_94	*	235945.70	848340.75	1.8 *
93. LR_96	*	235948.52	848339.25	1.8 *

FF

JOB: First Light - Taunton - Hart & County Sts -Existing AM RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
94. LR_97	*	235952.20	848335.62	1.8 *
95. LR_98	*	235954.11	848331.00	1.8 *
96. LR_99	*	235956.02	848326.38	1.8 *
97. LR_100	*	235957.94	848321.75	1.8 *

98.	LR_101	*	235959.84	848317.12	1.8 *
99.	LR_102	*	235961.77	848312.50	1.8 *
**.	LR_103	*	235963.67	848307.88	1.8 *
**.	LR_104	*	235965.58	848303.25	1.8 *
**.	LR_105	*	235967.50	848298.69	1.8 *
**.	LR_106	*	235969.41	848294.06	1.8 *
**.	LR_107	*	235971.31	848289.44	1.8 *
**.	LR_108	*	235973.23	848284.81	1.8 *
**.	LR_109	*	235988.36	848288.12	1.8 *
**.	LR_110	*	235986.45	848292.75	1.8 *
**.	LR_111	*	235984.55	848297.38	1.8 *
**.	LR_112	*	235982.62	848302.00	1.8 *
**.	LR_113	*	235980.70	848306.62	1.8 *
**.	LR_114	*	235978.80	848311.25	1.8 *
**.	LR_115	*	235976.89	848315.88	1.8 *
**.	LR_116	*	235974.98	848320.50	1.8 *
**.	LR_117	*	235973.06	848325.12	1.8 *
**.	LR_118	*	235971.16	848329.75	1.8 *
**.	LR_119	*	235969.23	848334.38	1.8 *
**.	LR_120	*	235967.33	848339.00	1.8 *

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	*	0.	0.	0.	0.	0.	0.	0.1	0.	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.3

```
 10.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.2    0.3
 20.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.5
 30.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.1    0.2    0.2    0.4
 40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.2    0.2    0.3    0.5
 50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.2    0.2    0.2    0.4
 60.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.2    0.2    0.2    0.4
 70.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.2    0.2    0.3    0.4
 80.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.2    0.2    0.4    0.5
 90.  *    0.6    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2
 0.3    0.3    0.5    0.5
100.  *    0.6    0.3    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3
0.3    0.3    0.5    0.5
110.  *    0.6    0.3    0.3    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3
0.4    0.5    0.6    0.7
120.  *    0.4    0.3    0.3    0.2    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.3
0.5    0.6    0.7    0.7

------*-----------------------------------------------------------------------------------------------------------------
---------------------
MAX   *    0.6    0.3    0.3    0.2    0.2    0.1    0.1     0.    0.1    0.1     0.     0.     0.     0.     0.     0.3
0.5    0.6    0.7    0.7
DEGR. *     90    100    110    110    120    110      0      0      0      0      0      0      0      0      0    100
120    120    120    110
FF                                                                                                          PAGE    5

      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.
```

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
130.	*	0.3	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.5	0.6	0.7	0.7
140.	*	0.1	0.1	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.6	0.7	0.7	0.6
150.	*	0.3	0.3	0.4	0.4	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.5	0.5	0.5	0.5	0.6
160.	*	0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.5	0.5	0.6	0.5	0.5	0.5	0.6	0.6	0.2	0.2	0.2	0.2	0.2
170.	*	0.5	0.5	0.5	0.7	0.7	0.7	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.	0.1	0.1	0.2	0.3
180.	*	0.4	0.4	0.4	0.6	0.5	0.6	0.6	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.5	0.	0.	0.1	0.1	0.1
190.	*	0.2	0.5	0.4	0.4	0.8	0.8	0.7	0.7	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.	0.	0.	0.	0.1
200.	*	0.3	0.3	0.7	0.7	0.8	0.7	0.8	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.	0.	0.	0.	0.
210.	*	0.2	0.5	0.6	0.7	0.7	0.6	0.6	0.5	0.6	0.5	0.5	0.5	0.4	0.4	0.3	0.	0.	0.	0.	0.
220.	*	0.4	0.5	0.6	0.7	0.6	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.	0.	0.	0.	0.
230.	*	0.4	0.5	0.8	0.7	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.	0.	0.	0.	0.
240.	*	0.4	0.7	0.9	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.	0.	0.	0.	0.
250.	*	0.5	0.8	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.	0.	0.	0.	0.
260.	*	0.5	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.	0.	0.	0.	0.
270.	*	0.3	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.1	0.	0.	0.	0.	0.

```
 280.  *    0.4    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.2    0.1     0.
 0.     0.     0.     0.
 290.  *    0.5    0.7    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.5    0.4    0.3    0.3    0.2    0.1     0.
 0.     0.     0.     0.
 300.  *    0.5    0.7    0.6    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.4    0.4    0.3    0.2    0.1     0.
 0.     0.     0.     0.
 310.  *    0.4    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.3    0.2    0.2    0.1     0.
 0.     0.     0.     0.
 320.  *    0.4    0.6    0.6    0.6    0.6    0.5    0.5    0.4    0.4    0.4    0.3    0.3    0.2    0.1    0.1     0.
 0.     0.     0.     0.
 330.  *    0.2    0.5    0.5    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.1    0.1     0.
 0.     0.     0.    0.1
 340.  *    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1     0.     0.
 0.    0.1    0.1    0.1
 350.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.
 0.    0.1    0.1    0.1
 360.  *     0.     0.     0.     0.     0.     0.     0.1     0.    0.1    0.1     0.     0.     0.     0.     0.     0.
 0.    0.1    0.2    0.3

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.6    0.8    0.9    0.7    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.6    0.6    0.6    0.5
 0.6    0.7    0.7    0.7
 DEGR. *     90    250    240    170    190    190    200    200    190    190    190    190    170    160    160    130
 140    140    120    110
```

FF PAGE 6

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
*	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36

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 REC37  REC38  REC39  REC40

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *    0.4    0.5    0.6    0.7    0.7    0.7    0.7    0.7    0.7    0.3    0.3    0.6    0.5    0.4    0.4    0.4
   0.3    0.2    0.2    0.2
 10.  *    0.5    0.6    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.3    0.4    0.5    0.5    0.4    0.4    0.4
 0.3    0.2    0.2    0.2
 20.  *    0.6    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.8    0.3    0.4    0.5    0.4    0.4    0.4    0.4
 0.2    0.2    0.2    0.2
 30.  *    0.5    0.5    0.5    0.5    0.6    0.7    0.7    0.7    0.8    0.4    0.5    0.5    0.4    0.4    0.4    0.3
 0.2    0.2    0.2    0.2
 40.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.8    0.4    0.5    0.4    0.4    0.4    0.4    0.3
 0.2    0.2    0.2    0.2
 50.  *    0.4    0.4    0.5    0.5    0.5    0.5    0.5    0.6    0.8    0.4    0.4    0.5    0.5    0.5    0.4    0.2
 0.2    0.2    0.2    0.2
 60.  *    0.4    0.4    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.3    0.4    0.5    0.4    0.4    0.4    0.3
 0.3    0.3    0.3    0.2
 70.  *    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.2    0.2    0.4    0.4    0.3    0.3    0.2
 0.2    0.2    0.1    0.1
 80.  *    0.5    0.5    0.5    0.5    0.4    0.4    0.4    0.6    0.7    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.1    0.1    0.1
 90.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.7     1.     0.     0.    0.1    0.1    0.1    0.1    0.1
 0.1    0.1    0.1    0.1
100.  *    0.5    0.5    0.5    0.5    0.5    0.7    0.8    0.9    0.8     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
110.  *    0.7    0.7    0.7    0.8    0.8    0.9    0.7    0.7    0.6     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
120.  *    0.7    0.7    0.7    0.8    0.8    0.8    0.8    0.7    0.4     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
130.  *    0.7    0.7    0.7    0.6    0.7    0.8    0.8    0.6    0.4     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
140.  *    0.6    0.6    0.6    0.8    0.9    1.1    0.9    0.7    0.6     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
150.  *    0.6    0.7    0.7    0.6    0.7    0.6    0.6    0.6    0.5    0.2     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
160.  *    0.2    0.2    0.4    0.4    0.4    0.6    0.6    0.6    0.5    0.4    0.2    0.1     0.     0.     0.     0.
0.     0.     0.     0.
170.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.5    0.5    0.2    0.1    0.1     0.     0.
0.     0.     0.     0.
```

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180.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.7    0.6    0.3    0.3    0.2    0.1    0.1
0.     0.     0.     0.
190.  *    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.7    0.6    0.3    0.3    0.3    0.2    0.1
0.1    0.1     0.     0.
200.  *     0.    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.4    0.7    0.4    0.4    0.3    0.3    0.3    0.3
0.1    0.1    0.1     0.
210.  *     0.     0.     0.    0.1    0.1    0.2    0.2    0.3    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.3
0.3    0.3    0.1    0.1
220.  *     0.     0.     0.     0.    0.1    0.1    0.2    0.3    0.5    0.5    0.5    0.4    0.4    0.3    0.3    0.3
0.3    0.3    0.3    0.1
230.  *     0.     0.     0.     0.     0.    0.1    0.1    0.3    0.4    0.4    0.2    0.3    0.4    0.4    0.3    0.3
0.3    0.3    0.1    0.1
240.  *     0.     0.     0.     0.     0.     0.     0.    0.2    0.3    0.2    0.2    0.2    0.2    0.1    0.1    0.1
0.1    0.1     0.     0.
250.  *     0.     0.     0.     0.     0.     0.     0.     0.    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1
0.1    0.1    0.1    0.1
260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.3    0.4    0.4    0.4    0.4    0.4    0.3
0.2    0.3    0.3    0.2
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.4    0.5    0.4    0.4    0.5    0.4
0.4    0.4    0.4    0.4
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.4    0.5    0.4    0.3    0.3    0.5
0.6    0.6    0.6    0.5
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.3    0.2    0.4    0.5    0.7    0.7
0.6    0.6    0.6    0.4
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.3    0.3    0.4    0.4    0.6    0.7    0.7
0.6    0.5    0.5    0.3
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.5    0.4    0.6    0.7    0.6    0.6
0.5    0.4    0.3    0.2
320.  *     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.4    0.5    0.5    0.5    0.7    0.5    0.4
0.4    0.4    0.2    0.2
330.  *    0.1    0.1    0.1    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.2    0.4    0.5    0.4    0.5    0.4
0.4    0.3    0.2    0.2
340.  *    0.1    0.3    0.4    0.4    0.5    0.5    0.5    0.5    0.6    0.2    0.2    0.4    0.6    0.5    0.4    0.4
0.4    0.3    0.2    0.2
350.  *    0.4    0.4    0.5    0.5    0.6    0.6    0.7    0.7    0.7    0.1    0.3    0.5    0.6    0.5    0.4    0.4
0.4    0.2    0.2    0.2
360.  *    0.4    0.5    0.6    0.7    0.7    0.7    0.7    0.7    0.7    0.3    0.3    0.6    0.5    0.4    0.4    0.4
0.3    0.2    0.2    0.2


------*-----------------------------------------------------------------------------------------------------------
```

```
 ---------------------
MAX   *    0.7    0.7    0.7    0.8    0.9    1.1    0.9    0.9     1.    0.7    0.6    0.6    0.6    0.7    0.7    0.7
0.6    0.6    0.6    0.5
DEGR. *    110     20     10    110    140    140    140    100     90    180    180      0    310    310    290    290
280    280    280    280
FF                                                                                                          PAGE   7

      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC41  REC42  REC43  REC44  REC45  REC46  REC47  REC48  REC49  REC50  REC51  REC52  REC53  REC54  REC55  REC56
REC57  REC58  REC59  REC60

------*-----------------------------------------------------------------------------------------------------------------
---------------------
   .  *    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
 10.  *    0.2    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 20.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 30.  *    0.2    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 40.  *    0.2    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 50.  *    0.2    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 60.  *    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 70.  *    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.    0.1
```

```
 80.   *    0.1    0.1    0.1    0.1    0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1
 0.1    0.2    0.2    0.5
 90.   *    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.2    0.2    0.2
 0.3    0.4    0.6    0.8
100.   *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.2    0.2    0.2    0.2    0.3
0.4    0.4    0.7     1.
110.   *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.3
0.4    0.5    0.8    0.9
120.   *     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.4
0.5    0.5    0.8    0.9
130.   *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.4
0.5    0.5    0.9    0.9
140.   *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.5
0.5    0.5    0.9    0.9
150.   *     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.4    0.5
0.5    0.5    0.9    0.9
160.   *     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.4    0.5
0.5    0.6    0.8     1.
170.   *     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.4    0.5
0.5    0.7     1.     1.
180.   *     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.5    0.6
0.6    0.9    1.2    1.1
190.   *     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.4    0.6    0.7
0.8    1.1    1.2     1.
200.   *     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.5    0.8    0.8
0.8    1.1    1.2     1.
210.   *     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.2    0.3    0.4    0.7    0.8    0.8
0.8    1.2    0.9    0.8
220.   *     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.4    0.6    0.6    0.6
0.7     1.     1.    0.4
230.   *     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.4    0.5    0.5    0.6
0.7    0.9    0.6    0.4
240.   *     0.     0.     0.     0.     0.     0.2    0.2    0.3    0.3    0.3    0.3    0.4    0.5    0.5    0.6    0.6
0.7    0.9    0.8    0.6
250.   *    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.5    0.6    0.5    0.7
0.8    0.7    0.6    0.4
260.   *    0.2    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.3
0.5    0.4    0.4    0.4
270.   *    0.4    0.4    0.4    0.4    0.4     0.     0.     0.     0.     0.     0.1    0.1     0.     0.     0.1    0.1
0.1    0.2    0.2    0.2
```

```
 280.  *    0.4    0.4    0.4    0.4    0.3     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.2    0.2
 0.2    0.2    0.2    0.2
 290.  *    0.4    0.4    0.3    0.3    0.3     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.2
 0.2    0.2    0.3    0.3
 300.  *    0.2    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1
 0.1    0.2    0.3    0.3
 310.  *    0.2    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.1    0.1    0.2    0.3
 320.  *    0.2    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.1
 330.  *    0.2    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 340.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 350.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 360.  *    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.5    0.7    0.8    0.8
 0.8    1.2    1.2    1.1
 DEGR. *    270    270    270    270    270    250    250    240    240    240    250    240    240    210    200    200
 190    210    180    180
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	REC61	REC62	REC63	REC64	REC65	REC66	REC67	REC68	REC69	REC70	REC71	REC72	REC73	REC74	REC75	REC76

```
 REC77  REC78  REC79  REC80

------*-------------------------------------------------------------------------------------------------------------------
---------------------
    .  *     0.    0.4    0.3    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
   0.    0.2    0.2    0.2
  10.  *     0.    0.4    0.3    0.3    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.2    0.2    0.2    0.2
  20.  *     0.    0.5    0.3    0.3    0.3    0.3    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.
  0.2    0.2    0.2    0.2
  30.  *     0.    0.5    0.3    0.3    0.3    0.3    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.
  0.2    0.2    0.2    0.2
  40.  *     0.    0.5    0.4    0.3    0.3    0.3    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.
  0.2    0.2    0.2    0.2
  50.  *     0.    0.4    0.4    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.
  0.2    0.2    0.2    0.3
  60.  *     0.    0.4    0.4    0.4    0.2    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.
  0.3    0.3    0.3    0.4
  70.  *    0.1    0.3    0.3    0.3    0.2    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
  0.4    0.4    0.5    0.5
  80.  *    0.5    0.3    0.4    0.2    0.2    0.1    0.2    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3
  0.4    0.4    0.5    0.5
  90.  *    0.9    0.4    0.5    0.4    0.4    0.3    0.3    0.3    0.4    0.4    0.5    0.5    0.5    0.5    0.4    0.4
  0.2    0.2    0.3    0.3
 100.  *     1.    0.3    0.3    0.4    0.4    0.4    0.7    0.7    0.7    0.8    0.6    0.6    0.5    0.5    0.4    0.3
 0.1    0.1    0.1    0.1
 110.  *    0.9    0.2    0.4    0.6    0.5    0.7    0.8    0.8    0.9    0.8    0.6    0.5    0.3    0.3    0.3    0.2
 0.     0.     0.     0.
 120.  *    0.9    0.2    0.6    0.8     1.     1.    0.9     1.    0.9    0.7    0.5    0.3    0.3    0.2    0.2    0.2
 0.     0.     0.     0.
 130.  *    0.7    0.5    0.7     1.     1.    0.9    0.9    0.9    0.6    0.5    0.4    0.3    0.2    0.2    0.2    0.2
 0.     0.     0.     0.
 140.  *    0.5    0.7     1.     1.    0.9    0.9    0.7    0.6    0.4    0.4    0.4    0.2    0.2    0.2    0.2    0.2
 0.     0.     0.     0.
 150.  *    0.4    0.7    0.8    0.8    0.7    0.7    0.7    0.6    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.1
 0.     0.     0.     0.
 160.  *    0.5    0.5    0.7    0.7    0.7    0.7    0.7    0.4    0.4    0.4    0.2    0.2    0.2    0.2    0.2    0.1
 0.     0.     0.     0.
 170.  *    0.4    0.7    0.7    0.7    0.7    0.7    0.6    0.4    0.4    0.4    0.2    0.2    0.2    0.2    0.2     0.
 0.     0.     0.     0.
```

```
180.  *    0.5    0.7    0.7    0.7    0.7    0.7    0.6    0.4    0.4    0.4    0.2    0.2    0.2    0.2    0.2    0.
0.     0.     0.     0.
190.  *    0.5    0.7    0.7    0.7    0.7    0.7    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.1    0.
0.     0.     0.     0.
200.  *    0.2    0.7    0.7    0.7    0.7    0.6    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.1    0.
0.     0.     0.     0.
210.  *    0.2    0.7    0.7    0.7    0.7    0.6    0.4    0.4    0.4    0.2    0.2    0.2    0.2    0.1    0.1    0.
0.     0.     0.     0.
220.  *    0.1    0.7    0.7    0.7    0.6    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.1    0.1    0.
0.     0.     0.     0.
230.  *    0.4    0.7    0.7    0.7    0.5    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.1    0.1    0.     0.
0.     0.     0.     0.
240.  *    0.4    0.7    0.5    0.5    0.4    0.4    0.3    0.3    0.2    0.2    0.2    0.1    0.1    0.1    0.     0.
0.     0.     0.     0.
250.  *    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.
0.     0.     0.    0.1
260.  *    0.3    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.     0.
0.     0.    0.1    0.1
270.  *    0.4    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.     0.     0.     0.     0.
0.     0.    0.1    0.1
280.  *    0.3     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.    0.1    0.2
290.  *    0.4     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.    0.2    0.2
300.  *    0.3     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.1    0.2    0.2
310.  *    0.4     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.1    0.2    0.2
320.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.2    0.2    0.2
330.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.2    0.2    0.2
340.  *     0.    0.3     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.2    0.2    0.2
350.  *     0.    0.4    0.3     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.2    0.2    0.2
360.  *     0.    0.4    0.3    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.2    0.2    0.2

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```

```
 ---------------------
 MAX   *     1.    0.7     1.     1.     1.     1.    0.9     1.    0.9    0.8    0.6    0.6    0.5    0.5    0.4    0.4
 0.4    0.4    0.5    0.5
 DEGR. *    100    140    140    130    120    120    120    120    110    100    100    100     90     90     90     90
 70     70     70     70
FF                                                                                                          PAGE    9

       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC81  REC82  REC83  REC84  REC85  REC86  REC87  REC88  REC89  REC90  REC91  REC92  REC93  REC94  REC95  REC96
 REC97  REC98  REC99  REC100

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.2    0.2    0.5    0.5    0.5    0.9    1.1    1.2    1.2    1.2    1.1    0.8    0.6    0.5    0.5    0.5
   0.4    0.5    0.6    0.7
  10.  *    0.2    0.3    0.5    0.5    0.6     1.    1.3    1.3    1.2    1.2    1.2    0.7    0.4    0.3    0.4    0.4
  0.5    0.7    0.6    0.6
  20.  *    0.2    0.3    0.5    0.5    0.8    1.2    1.4    1.4    1.2    1.1    1.2    0.4    0.3    0.4    0.4    0.4
  0.7    0.7    0.7    0.7
  30.  *    0.2    0.4    0.5    0.7    0.9    1.3    1.3    1.4    1.2    1.1     1.    0.3    0.3    0.4    0.4    0.5
  0.7    0.7    0.7    0.6
  40.  *    0.3    0.4    0.7    0.7    1.1    1.4    1.4    1.3    1.3    1.1    0.9    0.3    0.3    0.6    0.5    0.6
  0.6    0.6    0.4    0.4
  50.  *    0.4    0.5    0.6    0.8    1.1    1.4    1.4    1.2     1.     1.    0.8    0.3    0.5    0.7    0.5    0.7
  0.6    0.5    0.4    0.4
  60.  *    0.5    0.6    0.7    0.9    1.1    1.4    1.3    1.2     1.     1.    0.8    0.5    0.6    0.4    0.7    0.5
  0.5    0.4    0.4    0.4
  70.  *    0.6    0.6    0.9     1.    1.1    1.3    1.3    1.2    1.1    0.8    0.8    0.5    0.5    0.5    0.5    0.5
  0.5    0.4    0.4    0.4
```

```
 80.  *    0.5    0.6    0.7    0.7    0.8    1.     1.     1.     0.9    0.7    0.7    0.5    0.4    0.5    0.5    0.5
 0.5    0.4    0.4    0.4
 90.  *    0.3    0.3    0.4    0.5    0.6    0.6    0.7    0.5    0.2    0.4    0.3    0.3    0.4    0.5    0.5    0.5
 0.4    0.4    0.4    0.4
100.  *    0.1    0.1    0.2    0.2    0.5    0.5    0.5    0.3    0.3    0.1    0.3    0.4    0.5    0.5    0.6    0.5
0.4    0.4    0.4    0.4
110.  *     0.    0.1    0.1    0.1    0.2    0.2    0.3    0.3    0.3    0.3    0.5    0.5    0.6    0.6    0.6    0.5
0.5    0.5    0.5    0.5
120.  *     0.     0.     0.    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.4    0.6    0.6    0.6    0.6    0.5
0.5    0.5    0.5    0.5
130.  *     0.     0.     0.     0.     0.    0.2    0.2    0.2    0.3    0.3    0.4    0.6    0.7    0.8    0.7    0.7
0.7    0.6    0.6    0.6
140.  *     0.     0.     0.     0.     0.     0.     0.    0.2    0.2    0.2    0.4    0.4    0.5    0.7    0.7    0.7
0.7    0.7    0.7    0.6
150.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.4    0.4    0.6    0.6    0.6
0.6    0.6    0.5    0.4
160.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.3    0.4    0.4    0.4
0.4    0.4    0.4    0.3
170.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.2    0.2
0.1    0.1    0.1    0.1
180.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1
0.1    0.1    0.1    0.1
190.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
200.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
210.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
240.  *     0.     0.     0.     0.     0.    0.1    0.1    0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
250.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.2    0.2     0.     0.     0.     0.     0.
0.     0.     0.     0.
260.  *    0.1    0.1    0.1    0.1    0.2    0.2    0.6    0.5    0.5    0.5    0.5    0.3    0.1     0.     0.     0.
0.     0.     0.     0.
270.  *    0.2    0.2    0.2    0.2    0.3    0.4    0.9    0.9    0.9    0.8    0.9    0.5    0.5    0.1     0.     0.
0.     0.     0.     0.
```

```
 280.  *    0.2    0.2    0.2    0.3    0.4    0.6    1.1    1.1    1.1     1.    1.1    0.8    0.8    0.3    0.2    0.1
 0.     0.     0.     0.
 290.  *    0.2    0.2    0.2    0.4    0.5    0.7    1.1    1.2    1.2     1.    1.1     1.    0.8    0.5    0.2    0.2
 0.1    0.1     0.     0.
 300.  *    0.2    0.2    0.2    0.4    0.6    0.7    1.2    1.2    1.2     1.    1.1    0.9    0.9    0.5    0.3    0.2
 0.2    0.2    0.1    0.1
 310.  *    0.2    0.2    0.2    0.5    0.6    0.8    1.1    1.1     1.     1.     1.    0.8    0.7    0.5    0.2    0.2
 0.2    0.2    0.2    0.2
 320.  *    0.2    0.2    0.3    0.5    0.5    0.8    1.1    1.1     1.    0.9     1.    0.7    0.6    0.3    0.2    0.3
 0.3    0.3    0.3    0.3
 330.  *    0.2    0.2    0.3    0.5    0.5    0.7    1.1     1.     1.    0.9     1.    0.9    0.6    0.7    0.7    0.4
 0.4    0.3    0.4    0.4
 340.  *    0.2    0.2    0.4    0.5    0.5    0.8    1.1     1.    0.9    0.9    1.1    0.9    0.7    0.6    0.6    0.6
 0.6    0.4    0.5    0.5
 350.  *    0.2    0.2    0.4    0.5    0.5    0.9    1.1    0.9    0.9    1.2    1.1    0.9    0.6    0.6    0.6    0.6
 0.7    0.6    0.5    0.6
 360.  *    0.2    0.2    0.5    0.5    0.5    0.9    1.1    1.2    1.2    1.2    1.1    0.8    0.6    0.5    0.5    0.5
 0.4    0.5    0.6    0.7

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.6    0.6    0.9     1.    1.1    1.4    1.4    1.4    1.3    1.2    1.2     1.    0.9    0.8    0.7    0.7
 0.7    0.7    0.7    0.7
 DEGR. *     70     60     70     70     40     40     20     20     40      0     10    290    300    130     60     50
 20     10     20      0
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	REC101	REC102	REC103	REC104	REC105	REC106	REC107	REC108	REC109	REC110	REC111	REC112	REC113	REC114	REC115	REC116

REC117

.	*	0.7	0.6	0.6	0.6	0.7	0.	0.	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.1
10.	*	0.5	0.5	0.6	0.7	0.7	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.3
20.	*	0.6	0.6	0.6	0.7	0.7	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.3	0.3
30.	*	0.5	0.5	0.5	0.5	0.6	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.2	0.3	0.3
40.	*	0.4	0.4	0.4	0.4	0.4	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.4
50.	*	0.4	0.4	0.4	0.4	0.4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2
60.	*	0.4	0.4	0.4	0.4	0.4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2
70.	*	0.4	0.4	0.4	0.4	0.4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
80.	*	0.4	0.4	0.4	0.4	0.4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90.	*	0.4	0.4	0.4	0.4	0.4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100.	*	0.4	0.4	0.4	0.4	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
110.	*	0.5	0.5	0.5	0.4	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
120.	*	0.5	0.6	0.6	0.5	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
130.	*	0.6	0.6	0.6	0.4	0.3	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1
140.	*	0.6	0.5	0.4	0.3	0.2	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
150.	*	0.4	0.4	0.3	0.3	0.2	0.	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.5
160.	*	0.3	0.3	0.2	0.1	0.1	0.1	0.2	0.3	0.4	0.4	0.4	0.5	0.5	0.7	0.7	0.8	0.7
170.	*	0.1	0.1	0.1	0.1	0.	0.2	0.3	0.3	0.5	0.5	0.7	0.7	0.7	0.7	1.	1.	1.1
180.	*	0.1	0.1	0.1	0.	0.	0.3	0.4	0.5	0.6	0.7	0.7	0.7	0.8	1.	1.	1.1	1.2
190.	*	0.	0.	0.	0.	0.	0.2	0.4	0.6	0.6	0.7	0.8	0.8	0.8	0.8	0.9	1.1	1.
200.	*	0.	0.	0.	0.	0.	0.2	0.3	0.5	0.5	0.7	0.8	0.8	0.8	0.8	0.9	1.	0.9
210.	*	0.	0.	0.	0.	0.	0.2	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.9	0.8
220.	*	0.	0.	0.	0.	0.	0.3	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.8	0.9	0.7
230.	*	0.	0.	0.	0.	0.	0.3	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.8	0.9	0.6
240.	*	0.	0.	0.	0.	0.	0.4	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.8	0.8	0.6
250.	*	0.	0.	0.	0.	0.	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.8	0.8	0.3
260.	*	0.	0.	0.	0.	0.	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.8	0.8	0.3
270.	*	0.	0.	0.	0.	0.	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.8	0.8	0.4
280.	*	0.	0.	0.	0.	0.	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.9	1.1	0.9	0.6
290.	*	0.	0.	0.	0.	0.	0.6	0.6	0.6	0.6	0.6	0.7	0.7	1.	1.1	1.	1.	0.6
300.	*	0.	0.	0.	0.	0.	0.6	0.6	0.6	0.8	0.9	1.	1.1	1.1	1.	1.	0.9	0.4
310.	*	0.2	0.2	0.2	0.1	0.1	0.8	0.8	0.9	0.9	1.	1.	1.1	1.1	1.2	0.9	0.6	0.5
320.	*	0.3	0.3	0.2	0.2	0.1	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.	0.9	0.9	0.8	0.7
330.	*	0.2	0.2	0.2	0.2	0.2	0.6	0.6	0.6	0.6	0.8	0.9	1.	0.9	0.8	0.6	0.6	0.6
340.	*	0.4	0.4	0.3	0.4	0.5	0.4	0.3	0.3	0.3	0.3	0.4	0.5	0.5	0.5	0.5	0.3	0.3
350.	*	0.7	0.6	0.6	0.6	0.6	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.1
360.	*	0.7	0.6	0.6	0.6	0.7	0.	0.	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.1

MAX	*	0.7	0.6	0.6	0.7	0.7	0.8	0.8	0.9	0.9	1.	1.	1.1	1.1	1.2	1.1	1.1	1.2
DEGR.	*	0	0	0	10	0	310	310	310	310	310	300	300	300	310	280	180	180

THE HIGHEST CONCENTRATION OF 1.40 ppm OCCURRED AT RECEPTOR REC87.

FF

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**********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/11/2012 11:26:42 AM
** File: F:\2975 FirstLight\Microscale\Worst\12 Hart & County LOS\2012EXPM.ou2
**
**********************************************


                    CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                    PAGE  1

     JOB: First Light - Taunton - Hart & County Sts -Existing PM                  RUN: CAL3QHC
     RUN

     DATE : 12/11/12
     TIME : 11:26:40

        The MODE flag has been set to C for calculating CO averages.

      SITE & METEOROLOGICAL VARIABLES
      -------------------------------
      VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 100. CM
       U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  0.0 PPM

      LINK VARIABLES
      --------------
                 LINK DESCRIPTION               *              LINK COORDINATES (M)              *    LENGTH  BRG TYPE
                 VPH    EF      H     W    V/C QUEUE
                                               *       X1          Y1            X2          Y2    *     (M)
                                              (DEG)            (G/MI)   (M)   (M)       (VEH)

     ------------------------------------------*-------------------------------------------------*------------------------
     ---------------------------------
      1. Hart EB TL                            *  235870.27    848335.69   235946.16    848348.19 *      77.    81. AG
      215.   8.7   0.0    9.4
      2. Hart EB TL QUEUE                      *  235946.16    848348.19   235914.70    848343.00 *      32.   261. AG
      108. 100.0   0.0    3.4 0.78   5.3
      3. Hart EB RL                            *  235910.48    848343.12   235945.62    848345.50 *      35.    86. AG
```

303. 8.7 0.0 9.0
4. Hart EB RL QUEUE * 235945.62 848345.50 235800.83 848335.69 * 145. 266. AG
108. 100.0 0.0 3.0 1.10 24.2
5. Hart WB LT * 236039.62 848367.12 235970.39 848354.56 * 70. 260. AG
256. 8.7 0.0 9.4
6. Hart WB LT QUEUE * 235970.39 848354.56 236015.88 848362.81 * 46. 80. AG
108. 100.0 0.0 3.4 0.93 7.7
7. Hart WB RL * 236019.66 848365.25 235969.06 848357.75 * 51. 262. AG
188. 8.7 0.0 9.0
8. Hart WB RL QUEUE * 235969.06 848357.75 235996.34 848361.81 * 28. 82. AG
108. 100.0 0.0 3.0 0.68 4.6
9. 140 NB L * 235982.64 848282.94 235962.94 848336.75 * 57. 340. AG
235. 8.7 0.0 9.4
10. 140 NB L QUEUE * 235962.94 848336.75 235971.83 848312.50 * 26. 160. AG
81. 100.0 0.0 3.4 0.36 4.3
11. 140 NB TRL * 235983.98 848285.06 235965.06 848337.00 * 55. 340. AG
683. 8.7 0.0 9.0
12. 140 NB TRL QUEUE * 235965.06 848337.00 236028.08 848164.00 * 184. 160. AG
81. 100.0 0.0 3.0 1.04 30.7
13. 140 SB LL * 235919.00 848421.94 235949.36 848359.12 * 70. 154. AG
120. 8.7 0.0 9.4
14. 140 SB LL QUEUE * 235949.36 848359.12 235943.09 848372.06 * 14. 334. AG
88. 100.0 0.0 3.4 0.22 2.4
15. 140 SB TR * 235919.53 848419.00 235945.62 848359.38 * 65. 156. AG
860. 8.7 0.0 9.4
16. 140 SB TR QUEUE * 235945.62 848359.38 235518.41 849335.56 * 1066. 336. AG
88. 100.0 0.0 3.4 1.56 177.6
17. Hart EB OUTBOUND * 235965.73 848350.19 236039.41 848363.12 * 75. 80. AG
386. 8.7 0.0 9.4
18. Hart WB OUTBOUND * 235941.72 848352.06 235869.94 848338.81 * 73. 260. AG
397. 8.7 0.0 9.4
19. 140 NB OUTBOUND * 235952.52 848359.88 235923.64 848423.31 * 70. 336. AG
820. 8.7 0.0 9.4
20. 140 SB OUTBOUND * 235956.02 848338.31 235978.42 848283.25 * 59. 158. AG
1257. 8.7 0.0 9.4
21. EBL * 235946.53 848348.12 235953.55 848359.31 * 13. 32. AG
67. 9.7 0.0 9.0
22. EBT * 235946.27 848348.31 235965.38 848350.44 * 19. 84. AG
148. 8.7 0.0 9.0
23. EBR * 235944.44 848346.44 235956.19 848338.50 * 14. 124. AG

303. 10.8 0.0 9.0
24. WBL * 235969.30 848354.88 235956.00 848339.56 * 20. 221. AG
114. 9.7 0.0 9.0
25. WBT * 235969.11 848354.62 235942.53 848351.69 * 27. 264. AG
142. 8.7 0.0 9.0
26. WBR * 235967.92 848357.19 235952.72 848359.31 * 15. 278. AG
188. 10.8 0.0 9.0
27. NBL * 235962.92 848337.50 235942.34 848352.00 * 25. 305. AG
235. 9.7 0.0 9.0
28. NBT * 235964.83 848337.69 235952.81 848359.44 * 25. 331. AG
565. 8.7 0.0 9.0
29. NBR * 235964.45 848338.56 235967.66 848350.31 * 12. 15. AG
118. 10.8 0.0 9.0
30. SBL * 235949.27 848359.25 235965.19 848350.25 * 18. 119. AG
120. 9.7 0.0 9.0
31. SBT * 235945.70 848359.44 235956.09 848338.94 * 23. 153. AG
840. 8.7 0.0 9.0
32. SBR * 235946.34 848359.62 235939.53 848350.81 * 11. 218. AG
20. 10.8 0.0 9.0

FF

JOB: First Light - Taunton - Hart & County Sts -Existing PM RUN: CAL3QHC
RUN

DATE : 12/11/12
TIME : 11:26:40

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Hart EB TL QUEUE	*	110	88	4.0	215	1900	50.22	2	3
4. Hart EB RL QUEUE	*	110	88	4.0	303	1900	50.22	2	3
6. Hart WB LT QUEUE	*	110	88	4.0	256	1900	50.22	2	3
8. Hart WB RL QUEUE	*	110	88	4.0	188	1900	50.22	2	3
10. 140 NB L QUEUE	*	110	66	4.0	235	1900	50.22	2	3

12. 140 NB TRL QUEUE	*	110	66	4.0	683	1900	50.22	2	3
14. 140 SB LL QUEUE	*	110	72	4.0	120	1900	50.22	2	3
16. 140 SB TR QUEUE	*	110	72	4.0	860	1900	50.22	2	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235961.95	848360.62	1.8	*
2. LR_2	*	235956.00	848363.88	1.8	*
3. LR_3	*	235953.88	848368.38	1.8	*
4. LR_4	*	235951.77	848372.94	1.8	*
5. LR_5	*	235949.66	848377.50	1.8	*
6. LR_6	*	235947.55	848382.00	1.8	*
7. LR_7	*	235945.42	848386.50	1.8	*
8. LR_8	*	235943.31	848391.06	1.8	*
9. LR_9	*	235941.19	848395.56	1.8	*
10. LR_10	*	235939.06	848400.12	1.8	*
11. LR_11	*	235936.95	848404.62	1.8	*
12. LR_12	*	235934.84	848409.19	1.8	*
13. LR_13	*	235932.73	848413.69	1.8	*
14. LR_14	*	235930.61	848418.25	1.8	*
15. LR_15	*	235928.50	848422.75	1.8	*
16. LR_16	*	235913.59	848419.25	1.8	*
17. LR_17	*	235915.72	848414.69	1.8	*
18. LR_18	*	235917.83	848410.19	1.8	*
19. LR_19	*	235919.95	848405.62	1.8	*
20. LR_20	*	235922.06	848401.12	1.8	*
21. LR_21	*	235924.19	848396.56	1.8	*
22. LR_22	*	235926.30	848392.06	1.8	*
23. LR_23	*	235928.41	848387.50	1.8	*
24. LR_24	*	235930.52	848383.00	1.8	*
25. LR_25	*	235932.64	848378.50	1.8	*
26. LR_26	*	235934.75	848373.94	1.8	*
27. LR_27	*	235936.88	848369.44	1.8	*
28. LR_28	*	235938.98	848364.88	1.8	*
29. LR_29	*	235941.09	848360.31	1.8	*
30. LR_31	*	235969.44	848342.38	1.8	*
31. LR_32	*	235970.98	848345.12	1.8	*

32. LR_33	*	235975.58	848347.31	1.8 *
33. LR_34	*	235980.50	848348.19	1.8 *
34. LR_35	*	235985.42	848349.12	1.8 *
35. LR_36	*	235990.34	848350.00	1.8 *
36. LR_37	*	235995.27	848350.94	1.8 *

FF

JOB: First Light - Taunton - Hart & County Sts -Existing PM RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
37. LR_38	*	236000.19	848351.81	1.8 *
38. LR_39	*	236005.09	848352.69	1.8 *
39. LR_40	*	236010.02	848353.62	1.8 *
40. LR_41	*	236014.94	848354.50	1.8 *
41. LR_42	*	236019.84	848355.38	1.8 *
42. LR_43	*	236024.77	848356.31	1.8 *
43. LR_44	*	236029.69	848357.19	1.8 *
44. LR_45	*	236034.61	848358.12	1.8 *
45. LR_46	*	236039.53	848359.00	1.8 *
46. LR_47	*	236041.47	848373.19	1.8 *
47. LR_48	*	236036.55	848372.31	1.8 *
48. LR_49	*	236031.62	848371.44	1.8 *
49. LR_50	*	236026.70	848370.50	1.8 *
50. LR_51	*	236021.80	848369.62	1.8 *
51. LR_52	*	236016.88	848368.69	1.8 *
52. LR_53	*	236011.95	848367.81	1.8 *
53. LR_54	*	236007.05	848366.94	1.8 *
54. LR_55	*	236002.12	848366.00	1.8 *
55. LR_56	*	235997.20	848365.12	1.8 *
56. LR_57	*	235992.28	848364.25	1.8 *
57. LR_58	*	235987.38	848363.31	1.8 *
58. LR_59	*	235982.45	848362.44	1.8 *
59. LR_60	*	235977.53	848361.50	1.8 *
60. LR_61	*	235972.61	848360.62	1.8 *
61. LR_62	*	235967.69	848359.75	1.8 *
62. LR_64	*	235938.45	848355.44	1.8 *
63. LR_65	*	235933.53	848354.56	1.8 *
64. LR_66	*	235928.59	848353.69	1.8 *

65.	LR_67	*	235923.69	848352.88	1.8 *
66.	LR_68	*	235918.75	848352.00	1.8 *
67.	LR_69	*	235913.83	848351.12	1.8 *
68.	LR_70	*	235908.91	848350.25	1.8 *
69.	LR_71	*	235903.97	848349.44	1.8 *
70.	LR_72	*	235899.05	848348.56	1.8 *
71.	LR_73	*	235894.12	848347.69	1.8 *
72.	LR_74	*	235889.20	848346.88	1.8 *
73.	LR_75	*	235884.27	848346.00	1.8 *
74.	LR_76	*	235879.34	848345.12	1.8 *
75.	LR_77	*	235874.42	848344.25	1.8 *
76.	LR_78	*	235869.48	848343.44	1.8 *
77.	LR_79	*	235871.02	848332.75	1.8 *
78.	LR_80	*	235875.95	848333.56	1.8 *
79.	LR_81	*	235880.88	848334.44	1.8 *
80.	LR_82	*	235885.80	848335.31	1.8 *
81.	LR_83	*	235890.73	848336.12	1.8 *
82.	LR_84	*	235895.66	848337.00	1.8 *
83.	LR_85	*	235900.58	848337.88	1.8 *
84.	LR_86	*	235905.50	848338.75	1.8 *
85.	LR_87	*	235910.44	848339.56	1.8 *
86.	LR_88	*	235915.36	848340.44	1.8 *
87.	LR_89	*	235920.28	848341.31	1.8 *
88.	LR_90	*	235925.38	848341.50	1.8 *
89.	LR_91	*	235930.12	848341.56	1.8 *
90.	LR_92	*	235935.22	848341.44	1.8 *
91.	LR_93	*	235940.47	848342.31	1.8 *
92.	LR_94	*	235945.70	848340.75	1.8 *
93.	LR_96	*	235948.52	848339.25	1.8 *

FF

JOB: First Light - Taunton - Hart & County Sts -Existing PM RUN: CAL3QHC
RUN

RECEPTOR		COORDINATES (M) X	Y	Z
94.	LR_97	* 235952.20	848335.62	1.8 *
95.	LR_98	* 235954.11	848331.00	1.8 *
96.	LR_99	* 235956.02	848326.38	1.8 *
97.	LR_100	* 235957.94	848321.75	1.8 *

98.	LR_101	*	235959.84	848317.12	1.8 *
99.	LR_102	*	235961.77	848312.50	1.8 *
**.	LR_103	*	235963.67	848307.88	1.8 *
**.	LR_104	*	235965.58	848303.25	1.8 *
**.	LR_105	*	235967.50	848298.69	1.8 *
**.	LR_106	*	235969.41	848294.06	1.8 *
**.	LR_107	*	235971.31	848289.44	1.8 *
**.	LR_108	*	235973.23	848284.81	1.8 *
**.	LR_109	*	235988.36	848288.12	1.8 *
**.	LR_110	*	235986.45	848292.75	1.8 *
**.	LR_111	*	235984.55	848297.38	1.8 *
**.	LR_112	*	235982.62	848302.00	1.8 *
**.	LR_113	*	235980.70	848306.62	1.8 *
**.	LR_114	*	235978.80	848311.25	1.8 *
**.	LR_115	*	235976.89	848315.88	1.8 *
**.	LR_116	*	235974.98	848320.50	1.8 *
**.	LR_117	*	235973.06	848325.12	1.8 *
**.	LR_118	*	235971.16	848329.75	1.8 *
**.	LR_119	*	235969.23	848334.38	1.8 *
**.	LR_120	*	235967.33	848339.00	1.8 *

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	*	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.3	0.3	0.5	0.6	0.7

```
 10.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3
 0.4    0.6    0.7    0.7
 20.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3
 0.4    0.6    0.7    0.8
 30.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2
 0.3    0.5    0.7    0.7
 40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2
 0.4    0.5    0.6    0.6
 50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2
 0.5    0.6    0.6    0.6
 60.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3
 0.5    0.7    0.7    0.7
 70.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3
 0.6    0.7    0.7    0.7
 80.  *    0.5    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.4
 0.6    0.6    0.6    0.6
 90.  *    0.8    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.5
 0.6    0.6    0.6    0.6
100.  *     1.    0.6    0.3    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
0.7    0.7    0.7    0.7
110.  *    0.7    0.5    0.3    0.3    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.6
0.8    0.8    0.8    0.8
120.  *    0.5    0.4    0.3    0.3    0.2    0.2    0.2    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.8
0.8    0.8    0.8    0.8

------*-------------------------------------------------------------------------------------------------------------------
---------------------
MAX   *     1.    0.6    0.3    0.3    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.8
0.8    0.8    0.8    0.8
DEGR. *    100    100    100    110    110    110    120      0      0      0      0      0      0      0      0    120
110    110    110     20
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
130.	*	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.8	0.9	0.9	0.9	0.9
140.	*	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	1.	1.	0.9	0.9	0.9
150.	*	0.4	0.5	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.3	0.3	0.4	0.8	0.9	0.9	0.9	0.9
160.	*	0.6	0.9	0.7	0.7	0.7	0.8	0.8	0.6	0.6	0.8	0.8	0.8	0.8	0.8	0.8	0.4	0.5	0.4	0.5	0.6
170.	*	0.8	0.9	0.8	0.8	0.8	0.8	0.9	1.	1.	0.7	0.8	0.8	0.8	0.8	0.8	0.1	0.1	0.1	0.2	0.3
180.	*	0.7	0.7	0.5	0.6	0.7	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.1	0.1	0.1	0.2	0.2
190.	*	0.5	0.7	0.6	0.6	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.9	0.1	0.1	0.1	0.1	0.1
200.	*	0.4	0.5	0.7	0.9	1.	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.1	0.1	0.1	0.1	0.1
210.	*	0.3	0.6	0.6	1.	1.	1.	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.1	0.1	0.1	0.1	0.1
220.	*	0.4	0.6	0.8	1.	0.9	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.1	0.1	0.1	0.1	0.1
230.	*	0.5	0.7	1.	1.	0.8	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.	0.	0.1	0.1	0.1
240.	*	0.7	0.9	1.	0.9	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.	0.	0.	0.	0.
250.	*	0.7	1.	0.9	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.5	0.	0.	0.	0.	0.
260.	*	1.	0.8	0.8	0.7	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.4	0.	0.	0.	0.	0.
270.	*	0.7	0.8	0.7	0.6	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.4	0.	0.	0.	0.	0.

```
 280.  *    0.6    0.8    0.8    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.5    0.3     0.
 0.     0.     0.     0.
 290.  *    0.6    0.9    0.8    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.4    0.3     0.
 0.     0.     0.     0.
 300.  *    0.6    0.8    0.8    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.6    0.4    0.3     0.
 0.     0.     0.     0.
 310.  *    0.6    0.9    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.6    0.6    0.5    0.4    0.3    0.3     0.
 0.     0.     0.     0.
 320.  *    0.5    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.7    0.6    0.5    0.4    0.4    0.3    0.1
 0.1    0.1    0.1    0.2
 330.  *    0.5    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.6    0.5    0.5    0.5    0.4    0.5    0.4    0.2
 0.2    0.3    0.3    0.3
 340.  *    0.2    0.5    0.5    0.5    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.4
 0.4    0.5    0.6    0.6
 350.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.4
 0.4    0.5    0.6    0.8
 360.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.    0.3
 0.3    0.5    0.6    0.7

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *     1.     1.     1.     1.     1.     1.    0.9     1.     1.    0.9    0.8    0.8    0.8    0.8    0.9     1.
 1.    0.9    0.9    0.9
 DEGR. *    100    250    230    210    200    210    170    170    170    190    160    160    160    160    190    140
 140    130    130    130
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
*	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36

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 REC37  REC38  REC39  REC40

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *    0.7    0.9     1.     1.     1.     1.     1.     1.    1.1    0.3    0.3    0.6    0.6    0.6    0.6    0.5
   0.4    0.4    0.4    0.3
  10.  *    0.8    0.8    0.9    0.9    0.9    0.9    0.9    0.9     1.    0.3    0.4    0.6    0.6    0.6    0.5    0.5
  0.4    0.4    0.4    0.3
  20.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.9     1.    0.3    0.6    0.6    0.6    0.6    0.5    0.4
  0.4    0.4    0.4    0.2
  30.  *    0.7    0.8    0.8    0.8    0.8    0.8    0.8    0.9     1.    0.5    0.6    0.6    0.6    0.5    0.5    0.4
  0.4    0.4    0.3    0.2
  40.  *    0.7    0.7    0.7    0.7    0.8    0.8    0.8    0.9     1.    0.5    0.6    0.7    0.6    0.6    0.5    0.5
  0.5    0.5    0.4    0.2
  50.  *    0.6    0.6    0.6    0.6    0.6    0.8    0.8     1.     1.    0.5    0.6    0.7    0.7    0.6    0.5    0.5
  0.5    0.4    0.3    0.3
  60.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.8     1.     1.    0.5    0.6    0.6    0.6    0.5    0.5    0.4
  0.4    0.4    0.3    0.3
  70.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.8     1.    0.8    0.2    0.4    0.5    0.4    0.4    0.4    0.4
  0.3    0.3    0.2    0.2
  80.  *    0.6    0.6    0.6    0.6    0.6    0.8    0.9     1.     1.    0.1    0.2    0.3    0.3    0.3    0.2    0.2
  0.2    0.1    0.1    0.1
  90.  *    0.6    0.6    0.7    0.7    0.7    0.8    1.1    1.2    1.1     0.    0.1    0.1    0.1    0.1    0.1    0.1
  0.1    0.1    0.1    0.1
 100.  *    0.7    0.7    0.7    0.8    0.9    1.1    1.2    1.2    1.1     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 110.  *    0.8    0.9    0.9    0.9    1.1    1.1    1.2    1.3    0.7     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 120.  *    0.9    0.9    0.9    0.9     1.    1.1    1.1    0.9    0.5     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 130.  *    0.9    0.9     1.     1.    0.9    1.1     1.    0.9    0.8     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 140.  *    0.9     1.    1.2    1.2    1.3    1.2    1.1    0.9    1.1     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 150.  *    0.9     1.    1.1     1.     1.    0.9    0.8    0.9    1.1    0.2    0.1     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 160.  *    0.6    0.6    0.5    0.7    0.7    0.7    0.7    0.7    0.9    0.5    0.3    0.1    0.1     0.     0.     0.
 0.     0.     0.     0.
 170.  *    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.5    0.4    0.9    0.6    0.3    0.1    0.1    0.1    0.1
 0.     0.     0.     0.
```

```
180.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.3    0.9    0.8    0.4    0.3    0.3    0.1    0.1
0.1    0.1    0.1     0.
190.  *    0.1    0.1    0.2    0.2    0.2    0.3    0.3    0.3    0.4     1.    0.8    0.5    0.3    0.3    0.3    0.2
0.1    0.1    0.1    0.1
200.  *    0.1    0.1    0.1    0.1    0.2    0.3    0.3    0.3    0.5     1.    0.6    0.5    0.5    0.3    0.3    0.3
0.3    0.2    0.1    0.1
210.  *    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.5    0.6    0.5    0.5    0.5    0.4    0.3    0.3
0.3    0.3    0.2    0.2
220.  *    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.3    0.6    0.6    0.6    0.5    0.5    0.4    0.4    0.4
0.3    0.3    0.3    0.2
230.  *    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.3    0.4    0.5    0.3    0.4    0.4    0.4    0.4    0.4
0.3    0.3    0.1    0.1
240.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.4    0.3    0.2    0.2    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
250.  *     0.     0.     0.    0.1    0.1    0.1    0.1    0.2    0.3    0.5    0.4    0.4    0.4    0.4    0.3    0.3
0.3    0.2    0.2    0.2
260.  *     0.     0.     0.     0.     0.     0.    0.1    0.1    0.2    0.6    0.6    0.6    0.5    0.5    0.5    0.3
0.2    0.3    0.4    0.4
270.  *     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.9    0.7    0.7    0.6    0.5    0.6    0.6
0.5    0.5    0.7    0.7
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.8    0.5    0.5    0.5    0.5    0.5    0.7
0.6    0.6    0.6    0.6
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.6    0.3    0.4    0.7    0.7    0.9    0.9
1.     1.     1.     1.
300.  *     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.5    0.5    0.5    0.5    0.8    0.9    0.9
1.     1.    0.9    0.8
310.  *     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.7    0.6    0.4    0.7    0.8    0.9    0.9
0.8    0.6    0.6    0.5
320.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.6    0.6    0.6    0.8    0.8    0.8    0.7
0.7    0.6    0.5    0.5
330.  *    0.4    0.4    0.4    0.4    0.6    0.6    0.6    0.6    0.7    0.5    0.5    0.5    0.8    0.7    0.7    0.7
0.6    0.5    0.5    0.5
340.  *    0.7    0.7    0.8    0.9    0.9    0.9    0.9    0.9     1.    0.3    0.3    0.6    0.7    0.7    0.7    0.6
0.5    0.4    0.4    0.4
350.  *    0.8    0.9    0.9    0.9     1.     1.    1.1    1.1    1.1    0.1    0.3    0.6    0.6    0.6    0.6    0.5
0.4    0.4    0.4    0.4
360.  *    0.7    0.9     1.     1.     1.     1.     1.     1.    1.1    0.3    0.3    0.6    0.6    0.6    0.6    0.5
0.4    0.4    0.4    0.3

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```

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 ---------------------
 MAX   *    0.9     1.    1.2    1.2    1.3    1.2    1.2    1.3    1.1     1.    0.8    0.7    0.8    0.8    0.9    0.9
 1.     1.     1.     1.
 DEGR. *    120    140    140    140    140    140    100    110      0    190    180     40    320    300    290    290
 290    290    290    290
FF                                                                                                          PAGE    7

       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC41  REC42  REC43  REC44  REC45  REC46  REC47  REC48  REC49  REC50  REC51  REC52  REC53  REC54  REC55  REC56
 REC57  REC58  REC59  REC60

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 ---------------------
    .  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
   0.     0.     0.     0.
  10.  *    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  20.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  30.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  40.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  50.  *    0.3    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  60.  *    0.3    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.    0.1
  70.  *    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1
  0.1    0.2    0.3    0.3
```

```
 80.  *    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.3    0.3
 0.4    0.5    0.5    0.8
 90.  *    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.2    0.4    0.4    0.5
 0.7    0.8     1.    1.1
100.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.2    0.2    0.4    0.5    0.5    0.7
0.9     1.    1.1    1.2
110.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.3    0.4    0.5    0.6    0.7
1.     1.    1.1    1.1
120.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.3    0.5    0.6    0.6    0.8
1.     1.    1.1    1.1
130.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.4    0.5    0.6    0.6    0.9
1.     1.     1.     1.
140.  *     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.4    0.6    0.6    0.6    0.9
1.     1.     1.     1.
150.  *     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.5    0.6    0.6    0.6    0.9
0.9    0.9     1.     1.
160.  *     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.5    0.6    0.6    0.6    0.9
0.9    0.9     1.    1.1
170.  *     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.3    0.5    0.6    0.6    0.6     1.
1.     1.     1.    1.1
180.  *     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.4    0.6    0.7    0.7    0.8     1.
1.    1.2    1.2    1.2
190.  *    0.1     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.5    0.7    0.7    0.7    0.8    1.2
1.2    1.3    1.4    1.3
200.  *    0.1    0.1     0.     0.     0.    0.1    0.2    0.2    0.2    0.3    0.6    0.7    0.8    0.8    1.1    1.2
1.3    1.4    1.4    1.2
210.  *    0.1     0.     0.     0.     0.    0.2    0.2    0.2    0.2    0.4    0.6    0.8    0.8    0.9    1.2    1.3
1.4    1.4     1.    0.9
220.  *    0.1    0.1    0.1     0.     0.    0.2    0.3    0.3    0.4    0.4    0.7    0.7    0.7    0.8     1.    1.1
1.1    1.1    1.1    0.6
230.  *    0.1    0.1    0.1    0.1    0.1    0.3    0.4    0.4    0.4    0.6    0.7    0.7    0.8    0.9    1.1    1.1
1.1    1.1     1.    0.5
240.  *    0.1    0.2    0.2    0.2    0.2    0.3    0.3    0.4    0.4    0.7    0.7    0.7    0.8    0.9     1.    1.1
1.2    1.1     1.    0.7
250.  *    0.2    0.2    0.2    0.1    0.1    0.4    0.6    0.6    0.7    0.8    0.8    0.8    0.8    0.9     1.    1.1
1.    0.9    0.8    0.8
260.  *    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.4    0.6    0.6    0.6    0.6    0.6    0.6    0.7    0.6
0.6    0.6    0.7    0.8
270.  *    0.7    0.7    0.7    0.7    0.6    0.1    0.1    0.1    0.1    0.2    0.3    0.3    0.3    0.3    0.4    0.5
0.5    0.5    0.4    0.6
```

```
 280.  *    0.7    0.6    0.6    0.6    0.4     0.     0.     0.     0.     0.    0.2    0.2    0.3    0.3    0.3    0.3
 0.3    0.3    0.4    0.4
 290.  *    0.9    0.6    0.4    0.4    0.4     0.     0.     0.     0.    0.1    0.2    0.2    0.3    0.3    0.3    0.3
 0.3    0.3    0.3    0.4
 300.  *    0.6    0.6    0.5    0.4    0.3     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.3
 0.3    0.3    0.3    0.3
 310.  *    0.5    0.4    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2
 0.2    0.3    0.3    0.3
 320.  *    0.5    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.1    0.2    0.3
 330.  *    0.4    0.3    0.3    0.3    0.2     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.1    0.1    0.2
 340.  *    0.3    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.1    0.1
 350.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 360.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.9    0.7    0.7    0.7    0.6    0.5    0.6    0.6    0.7    0.8    0.8    0.8    0.8    0.9    1.2    1.3
 1.4    1.4    1.4    1.3
 DEGR. *    290    270    270    270    270    260    250    250    250    250    250    210    200    210    210    210
 210    200    190    190
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC61	REC62	REC63	REC64	REC65	REC66	REC67	REC68	REC69	REC70	REC71	REC72	REC73	REC74	REC75	REC76

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 REC77  REC78  REC79  REC80

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *     0.    0.7    0.5    0.4    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
   0.4    0.5    0.5    0.5
 10.  *     0.    0.8    0.5    0.3    0.3    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.5    0.5    0.5    0.5
 20.  *     0.    0.7    0.5    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.5    0.5    0.5    0.5
 30.  *     0.    0.6    0.5    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1    0.1    0.1     0.
 0.4    0.4    0.5    0.5
 40.  *     0.    0.6    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.1     0.     0.
 0.4    0.4    0.6    0.7
 50.  *     0.    0.6    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1     0.
 0.6    0.6    0.7    0.7
 60.  *    0.1    0.5    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1     0.     0.
 0.6    0.6    0.6    0.6
 70.  *    0.4    0.5    0.6    0.6    0.5    0.4    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.2    0.2    0.2
 0.7    0.7    0.6    0.6
 80.  *    0.9    0.5    0.4    0.4    0.4    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.6
 0.5    0.5    0.5    0.5
 90.  *    1.1    0.6    0.6    0.6    0.4    0.6    0.6    0.7    0.7    0.6    0.7    0.6    0.7    0.7    0.8    0.8
 0.2    0.2    0.3    0.3
100.  *    1.2    0.5    0.5    0.4    0.6    0.7    0.9    0.9    0.8    0.9    0.9    0.8    0.9    0.9     1.    0.9
0.2    0.2    0.2    0.2
110.  *    1.1    0.4    0.5    0.7    0.9     1.    0.9    0.9     1.    0.9    0.8    0.8    0.8    0.8    0.8    0.9
0.1    0.1    0.1    0.1
120.  *     1.    0.6    0.8     1.    1.1    1.1     1.    1.1     1.    0.9    0.8    0.7    0.7    0.8    0.7    0.6
0.     0.     0.     0.
130.  *    0.7     1.     1.    1.1     1.     1.    0.9    0.9    0.9    0.7    0.6    0.5    0.5    0.5    0.6    0.6
0.     0.     0.     0.
140.  *    0.6    1.1    1.1    1.1    0.9    0.9    0.9    0.7    0.5    0.4    0.5    0.5    0.5    0.5    0.5    0.6
0.     0.     0.     0.
150.  *    0.4     1.    0.8    0.9    0.9    0.8    0.7    0.6    0.4    0.4    0.4    0.5    0.5    0.5    0.5    0.4
0.     0.     0.     0.
160.  *    0.6    0.7    0.8    0.7    0.7    0.7    0.7    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.5    0.4
0.     0.     0.     0.
170.  *    0.6    0.7    0.7    0.7    0.7    0.7    0.6    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.5    0.4
0.     0.     0.     0.
```

```
 180.   *    0.6    0.7    0.7    0.7    0.7    0.7    0.6    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.5    0.3
 0.     0.     0.     0.
 190.   *    0.6    0.7    0.7    0.7    0.7    0.7    0.5    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.4    0.3
 0.     0.     0.     0.
 200.   *    0.3    0.7    0.7    0.7    0.7    0.6    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.4    0.3
 0.     0.     0.     0.
 210.   *    0.4    0.7    0.7    0.7    0.7    0.6    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.4    0.4    0.3
 0.     0.     0.     0.
 220.   *    0.3    0.8    0.8    0.8    0.7    0.6    0.5    0.5    0.6    0.6    0.6    0.6    0.5    0.4    0.5    0.4
 0.     0.     0.     0.
 230.   *    0.6    0.8    0.8    0.7    0.7    0.5    0.6    0.6    0.6    0.6    0.6    0.6    0.4    0.5    0.5    0.4
 0.     0.     0.     0.
 240.   *    0.6    0.8    0.7    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.5    0.5
 0.     0.     0.     0.
 250.   *    0.8    0.6    0.7    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.6    0.5    0.5    0.5    0.6    0.5
 0.     0.     0.    0.1
 260.   *    0.7    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.4    0.4
 0.1    0.1    0.2    0.2
 270.   *    0.8    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.2    0.3    0.3
 0.2    0.2    0.3    0.4
 280.   *    0.5    0.1    0.1    0.1    0.1    0.1    0.     0.     0.     0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.3    0.3    0.5    0.5
 290.   *    0.5     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.3    0.3    0.5    0.5
 300.   *    0.5     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.3    0.4    0.5    0.5
 310.   *    0.4     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.2    0.4    0.5    0.5
 320.   *    0.5     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.2    0.4    0.4    0.4
 330.   *    0.3    0.3    0.1    0.1    0.1    0.1    0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.2    0.4    0.4    0.4
 340.   *    0.1    0.6    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.
 0.2    0.4    0.5    0.5
 350.   *     0.    0.7    0.4    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.4    0.5    0.5    0.5
 360.   *     0.    0.7    0.5    0.4    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.4    0.5    0.5    0.5

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 ---------------------
MAX   *    1.2    1.1    1.1    1.1    1.1    1.1     1.    1.1     1.    0.9    0.9    0.8    0.9    0.9     1.    0.9
0.7    0.7    0.7    0.7
DEGR. *    100    140    140    130    120    120    120    120    110    100    100    100    100    100    100    100
 70     70     50     40
```



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      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC81  REC82  REC83  REC84  REC85  REC86  REC87  REC88  REC89  REC90  REC91  REC92  REC93  REC94  REC95  REC96
REC97  REC98  REC99  REC100

------*-------------------------------------------------------------------------------------------------------------
---------------------
   .  *    0.5    0.6    0.6    0.6    0.6     1.    1.3    1.2    1.2    1.3    1.5    1.1    0.8    0.9    0.8    0.7
  0.8    0.8    0.8    0.9
 10.  *    0.5    0.6    0.6    0.6    0.8    1.2    1.4    1.2    1.2    1.2    1.3     1.    0.7    0.8    0.8    0.6
 0.7    0.9    0.8    0.9
 20.  *    0.5    0.6    0.7    0.8    0.9    1.3    1.4    1.4    1.2    1.3    1.3    0.6    0.6    0.6    0.6    0.5
 0.9    1.1    1.2    1.1
 30.  *    0.7    0.8    0.8    0.8     1.    1.4    1.4    1.4    1.4    1.4    1.2    0.5    0.5    0.6    0.8    0.8
 0.9     1.     1.     1.
 40.  *    0.8    0.8    0.8    0.8    1.1    1.5    1.5    1.5    1.6    1.1    1.1    0.5    0.5    0.8    0.7     1.
 1.    0.9    0.9    0.9
 50.  *    0.7    0.7    0.8    1.1    1.2    1.5    1.6    1.4    1.2     1.     1.    0.7    0.7    0.9    0.8     1.
 0.9    0.9    0.8    0.8
 60.  *    0.7    0.7    0.9    0.9     1.    1.4    1.4    1.3     1.    1.1    1.1    0.8    0.8    0.8    0.9    0.9
 0.8    0.8    0.8    0.8
 70.  *    0.6    0.7    0.9     1.    1.2    1.6    1.5    1.4    1.2    1.1    1.1    0.8    0.8    0.7    0.8    0.8
 0.8    0.8    0.8    0.7
```

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 80.  *    0.5    0.7    0.8    0.9    1.1    1.3    1.2    0.9     1.    0.7    0.8    0.7    0.8    0.6    0.7    0.8
 0.8    0.8    0.8    0.7
 90.  *    0.3    0.3    0.6    0.6    0.7    0.7    0.8    0.7    0.4    0.6    0.5    0.5    0.5    0.6    0.8    0.8
 0.8    0.8    0.8    0.7
100.  *    0.2    0.2    0.3    0.3    0.5    0.5    0.5    0.3    0.3    0.3    0.3    0.6    0.8    0.7    0.8    0.8
0.8    0.8    0.7    0.7
110.  *    0.1    0.1    0.1    0.2    0.2    0.3    0.4    0.4    0.4    0.5    0.7    0.7    0.8    0.7    0.8    0.8
0.8    0.8    0.7    0.7
120.  *    0.1    0.2    0.2    0.2    0.2    0.2    0.3    0.4    0.5    0.5    0.6    0.7    0.7    0.9    0.9     1.
1.    0.9    0.9    0.8
130.  *     0.    0.1    0.1    0.2    0.2    0.2    0.2    0.3    0.4    0.4    0.6    0.7    0.9    1.2    1.2    1.1
1.1     1.    0.9    0.9
140.  *     0.     0.     0.     0.    0.1    0.1    0.2    0.2    0.2    0.4    0.5    0.7    0.9    1.1    1.1    1.1
1.     1.     1.    0.9
150.  *     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.2    0.3    0.5    0.6    0.9    0.9    0.9
0.9    0.9    0.8    0.7
160.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.2    0.3    0.3    0.6    0.6    0.6
0.5    0.5    0.5    0.5
170.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.3    0.2    0.2
0.2    0.2    0.2    0.2
180.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1
0.1    0.1    0.1    0.1
190.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1
0.1    0.1    0.1    0.1
200.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
210.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
240.  *     0.     0.     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
250.  *    0.1    0.1    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.2    0.2    0.1     0.     0.     0.     0.
0.     0.     0.     0.
260.  *    0.2    0.4    0.4    0.4    0.4    0.5    0.8    0.7    0.7    0.7    0.7    0.4    0.1    0.1     0.     0.
0.     0.     0.     0.
270.  *    0.5    0.5    0.5    0.6    0.6    0.8    1.1     1.     1.     1.    1.1    0.8    0.7    0.2    0.1    0.1
0.1     0.     0.     0.
```

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 280.  *    0.5    0.6    0.6    0.6    0.7    0.8    1.1    1.2    1.2    1.1    1.3    0.9    0.8    0.5    0.3    0.1
 0.1    0.1    0.1    0.1
 290.  *    0.5    0.6    0.6    0.6    0.7    0.8    1.2    1.3    1.1    1.1    1.1     1.    0.8    0.6    0.4    0.3
 0.1    0.1    0.1    0.1
 300.  *    0.5    0.5    0.6    0.6    0.6    0.7    1.2    1.2    1.2     1.    1.1    0.9    0.9    0.7    0.5    0.3
 0.2    0.2    0.2    0.2
 310.  *    0.5    0.5    0.5    0.5    0.6    0.7    1.1    1.1     1.     1.     1.    0.8    0.8    0.7    0.3    0.3
 0.3    0.3    0.3    0.3
 320.  *    0.5    0.5    0.5    0.5    0.5    0.7    1.1    1.1     1.    0.9     1.    0.9    0.8    0.5    0.5    0.4
 0.3    0.3    0.3    0.3
 330.  *    0.4    0.5    0.5    0.5    0.5    0.7    1.1    1.1     1.     1.    1.1    1.2    0.8     1.    0.9     1.
 0.7    0.7    0.8    0.7
 340.  *    0.5    0.6    0.6    0.6    0.6    0.8    1.2    1.1     1.    1.2    1.3    1.2    1.1     1.     1.    0.9
 0.8    0.9    0.9     1.
 350.  *    0.5    0.6    0.6    0.6    0.6    0.9    1.2     1.    1.2    1.3    1.4    1.4    1.2     1.    0.9     1.
 0.9     1.     1.    1.1
 360.  *    0.5    0.6    0.6    0.6    0.6     1.    1.3    1.2    1.2    1.3    1.5    1.1    0.8    0.9    0.8    0.7
 0.8    0.8    0.8    0.9

 ------*-------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.8    0.8    0.9    1.1    1.2    1.6    1.6    1.5    1.6    1.4    1.5    1.4    1.2    1.2    1.2    1.1
 1.1    1.1    1.2    1.1
 DEGR. *     40     30     60     50     50     70     50     40     40     30      0    350    350    130    130    130
 130     20     20     20
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC101 REC102 REC103 REC104 REC105 REC106 REC107 REC108 REC109 REC110 REC111 REC112 REC113 REC114 REC115 REC116
```

REC117

.	*	1.	1.	1.	1.1	1.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.2
10.	*	1.	1.	1.	1.	1.	0.	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.4	0.3	0.3
20.	*	1.1	1.1	1.	1.1	1.	0.	0.	0.	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3
30.	*	0.9	0.8	0.8	0.8	0.8	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.3	0.3	0.3	0.3
40.	*	0.8	0.7	0.7	0.8	0.8	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.3	0.4
50.	*	0.7	0.7	0.7	0.7	0.7	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.5
60.	*	0.7	0.7	0.7	0.7	0.7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2
70.	*	0.7	0.7	0.7	0.7	0.7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2
80.	*	0.7	0.7	0.7	0.7	0.6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90.	*	0.7	0.7	0.7	0.7	0.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100.	*	0.7	0.7	0.7	0.7	0.4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
110.	*	0.7	0.7	0.7	0.6	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
120.	*	0.8	0.9	0.9	0.7	0.4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
130.	*	0.9	0.9	0.7	0.5	0.4	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1
140.	*	0.8	0.8	0.6	0.5	0.3	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
150.	*	0.7	0.6	0.6	0.5	0.3	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5
160.	*	0.5	0.4	0.4	0.3	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.7	0.8	0.8	0.8	1.	1.1
170.	*	0.2	0.2	0.2	0.1	0.	0.3	0.4	0.5	0.5	0.8	0.8	0.8	1.	1.2	1.2	1.2	1.3
180.	*	0.1	0.1	0.1	0.1	0.	0.3	0.4	0.5	0.7	0.8	0.9	0.9	0.9	1.2	1.4	1.4	1.3
190.	*	0.1	0.1	0.1	0.1	0.	0.3	0.4	0.7	0.9	0.9	0.9	1.	1.1	1.2	1.2	1.3	1.3
200.	*	0.	0.	0.	0.	0.	0.2	0.4	0.6	0.8	1.	1.	1.	1.1	1.2	1.2	1.2	1.1
210.	*	0.	0.	0.	0.	0.	0.2	0.5	0.7	0.8	0.8	0.8	0.8	0.9	1.1	1.1	1.1	1.
220.	*	0.	0.	0.	0.	0.	0.3	0.6	0.7	0.8	0.8	0.8	0.8	1.	1.	1.1	1.1	0.9
230.	*	0.	0.	0.	0.	0.	0.4	0.7	0.7	0.8	0.8	0.8	0.9	1.	1.	1.	1.1	0.7
240.	*	0.	0.	0.	0.	0.	0.4	0.7	0.8	0.8	0.8	0.8	0.9	1.	1.	1.	1.	0.6
250.	*	0.	0.	0.	0.	0.	0.7	0.8	0.8	0.8	0.8	0.8	0.9	1.	1.	1.	1.	0.4
260.	*	0.	0.	0.	0.	0.	0.7	0.8	0.8	0.8	0.8	0.8	1.	1.	1.	1.	1.	0.6
270.	*	0.	0.	0.	0.	0.	0.8	0.8	0.8	0.8	0.8	0.9	1.	1.1	1.1	1.1	1.	0.7
280.	*	0.1	0.	0.	0.	0.	0.8	0.8	0.8	0.9	0.9	1.	1.1	1.1	1.1	1.3	1.4	1.
290.	*	0.1	0.1	0.1	0.1	0.1	0.9	0.9	0.9	0.9	0.9	1.	1.1	1.3	1.3	1.3	1.2	0.8
300.	*	0.2	0.2	0.2	0.2	0.2	0.9	1.	1.	1.	1.1	1.4	1.4	1.4	1.4	1.3	1.1	0.7
310.	*	0.2	0.2	0.2	0.2	0.2	1.	1.1	1.2	1.2	1.3	1.4	1.3	1.4	1.5	1.3	0.8	0.9
320.	*	0.4	0.4	0.3	0.3	0.3	1.2	1.2	1.2	1.1	1.2	1.4	1.4	1.4	1.3	1.	0.9	0.9
330.	*	0.5	0.4	0.5	0.5	0.5	1.	1.	1.2	1.1	1.1	1.2	1.4	1.4	1.2	0.9	0.8	0.7
340.	*	0.9	0.8	0.9	0.9	0.8	0.5	0.6	0.6	0.7	0.6	0.6	0.7	0.6	0.7	0.7	0.5	0.6
350.	*	1.	1.1	1.	1.1	1.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2
360.	*	1.	1.	1.	1.1	1.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.2

MAX	*	1.1	1.1	1.	1.1	1.2	1.2	1.2	1.2	1.2	1.3	1.4	1.4	1.4	1.5	1.4	1.4	1.3
DEGR.	*	20	20	0	0	350	320	320	310	310	310	300	300	300	310	180	180	170

THE HIGHEST CONCENTRATION OF 1.60 ppm OCCURRED AT RECEPTOR REC89.

FF

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*******************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/11/2012 11:28:05 AM
** File: F:\2975 FirstLight\Microscale\Worst\12 Hart & County LOS\2012EXSA.ou2
**
*******************************************


                    CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                    PAGE  1

     JOB: First Light - Taunton - Hart & County Sts -Existing Saturday          RUN: CAL3QHC
     RUN

     DATE : 12/11/12
     TIME : 11:28: 2

        The MODE flag has been set to C for calculating CO averages.

      SITE & METEOROLOGICAL VARIABLES
      -------------------------------
      VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 100. CM
       U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  0.0 PPM

      LINK VARIABLES
      --------------
                 LINK DESCRIPTION               *              LINK COORDINATES (M)              *    LENGTH  BRG TYPE
                 VPH    EF      H     W    V/C QUEUE
                                               *       X1          Y1            X2          Y2    *     (M)
                                              (DEG)            (G/MI)   (M)   (M)       (VEH)

     ------------------------------------------*-------------------------------------------------*------------------------
     ---------------------------------
      1. Hart EB TL                            *  235870.27    848335.69   235946.16    848348.19 *      77.    81. AG
      207.   8.7   0.0    9.4
      2. Hart EB TL QUEUE                      *  235946.16    848348.19   235916.20    848343.25 *      30.   261. AG
      108. 100.0   0.0    3.4 0.75   5.1
      3. Hart EB RL                            *  235910.48    848343.12   235945.62    848345.50 *      35.    86. AG
```

320. 8.7 0.0 9.0
4. Hart EB RL QUEUE * 235945.62 848345.50 235746.36 848332.06 * 200. 266. AG
108. 100.0 0.0 3.0 1.16 33.3
5. Hart WB LT * 236039.62 848367.12 235970.39 848354.56 * 70. 260. AG
239. 8.7 0.0 9.4
6. Hart WB LT QUEUE * 235970.39 848354.56 236008.78 848361.50 * 39. 80. AG
108. 100.0 0.0 3.4 0.87 6.5
7. Hart WB RL * 236019.66 848365.25 235969.06 848357.75 * 51. 262. AG
152. 8.7 0.0 9.0
8. Hart WB RL QUEUE * 235969.06 848357.75 235991.11 848361.00 * 22. 81. AG
108. 100.0 0.0 3.0 0.55 3.7
9. 140 NB L * 235982.64 848282.94 235962.94 848336.75 * 57. 340. AG
221. 8.7 0.0 9.4
10. 140 NB L QUEUE * 235962.94 848336.75 235971.30 848313.94 * 24. 160. AG
81. 100.0 0.0 3.4 0.34 4.1
11. 140 NB TRL * 235983.98 848285.06 235965.06 848337.00 * 55. 340. AG
774. 8.7 0.0 9.0
12. 140 NB TRL QUEUE * 235965.06 848337.00 236126.23 847894.62 * 471. 160. AG
81. 100.0 0.0 3.0 1.18 78.5
13. 140 SB LL * 235919.00 848421.94 235949.36 848359.12 * 70. 154. AG
120. 8.7 0.0 9.4
14. 140 SB LL QUEUE * 235949.36 848359.12 235943.09 848372.06 * 14. 334. AG
88. 100.0 0.0 3.4 0.22 2.4
15. 140 SB TR * 235919.53 848419.00 235945.62 848359.38 * 65. 156. AG
860. 8.7 0.0 9.4
16. 140 SB TR QUEUE * 235945.62 848359.38 235518.41 849335.56 * 1066. 336. AG
88. 100.0 0.0 3.4 1.56 177.6
17. Hart EB OUTBOUND * 235965.73 848350.19 236039.41 848363.12 * 75. 80. AG
423. 8.7 0.0 9.4
18. Hart WB OUTBOUND * 235941.72 848352.06 235869.94 848338.81 * 73. 260. AG
355. 8.7 0.0 9.4
19. 140 NB OUTBOUND * 235952.52 848359.88 235923.64 848423.31 * 70. 336. AG
830. 8.7 0.0 9.4
20. 140 SB OUTBOUND * 235956.02 848338.31 235978.42 848283.25 * 59. 158. AG
1285. 8.7 0.0 9.4
21. EBL * 235946.53 848348.12 235953.55 848359.31 * 13. 32. AG
58. 9.7 0.0 9.0
22. EBT * 235946.27 848348.31 235965.38 848350.44 * 19. 84. AG
149. 8.7 0.0 9.0
23. EBR * 235944.44 848346.44 235956.19 848338.50 * 14. 124. AG

320. 10.8 0.0 9.0
24. WBL * 235969.30 848354.88 235956.00 848339.56 * 20. 221. AG
125. 9.7 0.0 9.0
25. WBT * 235969.11 848354.62 235942.53 848351.69 * 27. 264. AG
114. 8.7 0.0 9.0
26. WBR * 235967.92 848357.19 235952.72 848359.31 * 15. 278. AG
152. 10.8 0.0 9.0
27. NBL * 235962.92 848337.50 235942.34 848352.00 * 25. 305. AG
221. 9.7 0.0 9.0
28. NBT * 235964.83 848337.69 235952.81 848359.44 * 25. 331. AG
620. 8.7 0.0 9.0
29. NBR * 235964.45 848338.56 235967.66 848350.31 * 12. 15. AG
154. 10.8 0.0 9.0
30. SBL * 235949.27 848359.25 235965.19 848350.25 * 18. 119. AG
120. 9.7 0.0 9.0
31. SBT * 235945.70 848359.44 235956.09 848338.94 * 23. 153. AG
840. 8.7 0.0 9.0
32. SBR * 235946.34 848359.62 235939.53 848350.81 * 11. 218. AG
20. 10.8 0.0 9.0

FF

JOB: First Light - Taunton - Hart & County Sts -Existing Saturday RUN: CAL3QHC
RUN

DATE : 12/11/12
TIME : 11:28: 2

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Hart EB TL QUEUE	*	110	88	4.0	207	1900	50.22	2	3
4. Hart EB RL QUEUE	*	110	88	4.0	320	1900	50.22	2	3
6. Hart WB LT QUEUE	*	110	88	4.0	239	1900	50.22	2	3
8. Hart WB RL QUEUE	*	110	88	4.0	152	1900	50.22	2	3
10. 140 NB L QUEUE	*	110	66	4.0	221	1900	50.22	2	3

12. 140 NB TRL QUEUE	*	110	66	4.0	774	1900	50.22	2	3
14. 140 SB LL QUEUE	*	110	72	4.0	120	1900	50.22	2	3
16. 140 SB TR QUEUE	*	110	72	4.0	860	1900	50.22	2	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235961.95	848360.62	1.8	*
2. LR_2	*	235956.00	848363.88	1.8	*
3. LR_3	*	235953.88	848368.38	1.8	*
4. LR_4	*	235951.77	848372.94	1.8	*
5. LR_5	*	235949.66	848377.50	1.8	*
6. LR_6	*	235947.55	848382.00	1.8	*
7. LR_7	*	235945.42	848386.50	1.8	*
8. LR_8	*	235943.31	848391.06	1.8	*
9. LR_9	*	235941.19	848395.56	1.8	*
10. LR_10	*	235939.06	848400.12	1.8	*
11. LR_11	*	235936.95	848404.62	1.8	*
12. LR_12	*	235934.84	848409.19	1.8	*
13. LR_13	*	235932.73	848413.69	1.8	*
14. LR_14	*	235930.61	848418.25	1.8	*
15. LR_15	*	235928.50	848422.75	1.8	*
16. LR_16	*	235913.59	848419.25	1.8	*
17. LR_17	*	235915.72	848414.69	1.8	*
18. LR_18	*	235917.83	848410.19	1.8	*
19. LR_19	*	235919.95	848405.62	1.8	*
20. LR_20	*	235922.06	848401.12	1.8	*
21. LR_21	*	235924.19	848396.56	1.8	*
22. LR_22	*	235926.30	848392.06	1.8	*
23. LR_23	*	235928.41	848387.50	1.8	*
24. LR_24	*	235930.52	848383.00	1.8	*
25. LR_25	*	235932.64	848378.50	1.8	*
26. LR_26	*	235934.75	848373.94	1.8	*
27. LR_27	*	235936.88	848369.44	1.8	*
28. LR_28	*	235938.98	848364.88	1.8	*
29. LR_29	*	235941.09	848360.31	1.8	*
30. LR_31	*	235969.44	848342.38	1.8	*
31. LR_32	*	235970.98	848345.12	1.8	*

32. LR_33	235975.58	848347.31	1.8
33. LR_34	235980.50	848348.19	1.8
34. LR_35	235985.42	848349.12	1.8
35. LR_36	235990.34	848350.00	1.8
36. LR_37	235995.27	848350.94	1.8

FF

JOB: First Light - Taunton - Hart & County Sts -Existing Saturday RUN: CAL3QHC
RUN

RECEPTOR	COORDINATES (M) X	Y	Z
37. LR_38	236000.19	848351.81	1.8
38. LR_39	236005.09	848352.69	1.8
39. LR_40	236010.02	848353.62	1.8
40. LR_41	236014.94	848354.50	1.8
41. LR_42	236019.84	848355.38	1.8
42. LR_43	236024.77	848356.31	1.8
43. LR_44	236029.69	848357.19	1.8
44. LR_45	236034.61	848358.12	1.8
45. LR_46	236039.53	848359.00	1.8
46. LR_47	236041.47	848373.19	1.8
47. LR_48	236036.55	848372.31	1.8
48. LR_49	236031.62	848371.44	1.8
49. LR_50	236026.70	848370.50	1.8
50. LR_51	236021.80	848369.62	1.8
51. LR_52	236016.88	848368.69	1.8
52. LR_53	236011.95	848367.81	1.8
53. LR_54	236007.05	848366.94	1.8
54. LR_55	236002.12	848366.00	1.8
55. LR_56	235997.20	848365.12	1.8
56. LR_57	235992.28	848364.25	1.8
57. LR_58	235987.38	848363.31	1.8
58. LR_59	235982.45	848362.44	1.8
59. LR_60	235977.53	848361.50	1.8
60. LR_61	235972.61	848360.62	1.8
61. LR_62	235967.69	848359.75	1.8
62. LR_64	235938.45	848355.44	1.8
63. LR_65	235933.53	848354.56	1.8
64. LR_66	235928.59	848353.69	1.8

65. LR_67	*	235923.69	848352.88	1.8 *
66. LR_68	*	235918.75	848352.00	1.8 *
67. LR_69	*	235913.83	848351.12	1.8 *
68. LR_70	*	235908.91	848350.25	1.8 *
69. LR_71	*	235903.97	848349.44	1.8 *
70. LR_72	*	235899.05	848348.56	1.8 *
71. LR_73	*	235894.12	848347.69	1.8 *
72. LR_74	*	235889.20	848346.88	1.8 *
73. LR_75	*	235884.27	848346.00	1.8 *
74. LR_76	*	235879.34	848345.12	1.8 *
75. LR_77	*	235874.42	848344.25	1.8 *
76. LR_78	*	235869.48	848343.44	1.8 *
77. LR_79	*	235871.02	848332.75	1.8 *
78. LR_80	*	235875.95	848333.56	1.8 *
79. LR_81	*	235880.88	848334.44	1.8 *
80. LR_82	*	235885.80	848335.31	1.8 *
81. LR_83	*	235890.73	848336.12	1.8 *
82. LR_84	*	235895.66	848337.00	1.8 *
83. LR_85	*	235900.58	848337.88	1.8 *
84. LR_86	*	235905.50	848338.75	1.8 *
85. LR_87	*	235910.44	848339.56	1.8 *
86. LR_88	*	235915.36	848340.44	1.8 *
87. LR_89	*	235920.28	848341.31	1.8 *
88. LR_90	*	235925.38	848341.50	1.8 *
89. LR_91	*	235930.12	848341.56	1.8 *
90. LR_92	*	235935.22	848341.44	1.8 *
91. LR_93	*	235940.47	848342.31	1.8 *
92. LR_94	*	235945.70	848340.75	1.8 *
93. LR_96	*	235948.52	848339.25	1.8 *

FF

JOB: First Light - Taunton - Hart & County Sts -Existing Saturday RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
94. LR_97	*	235952.20	848335.62	1.8 *
95. LR_98	*	235954.11	848331.00	1.8 *
96. LR_99	*	235956.02	848326.38	1.8 *
97. LR_100	*	235957.94	848321.75	1.8 *

98.	LR_101	*	235959.84	848317.12	1.8 *
99.	LR_102	*	235961.77	848312.50	1.8 *
**.	LR_103	*	235963.67	848307.88	1.8 *
**.	LR_104	*	235965.58	848303.25	1.8 *
**.	LR_105	*	235967.50	848298.69	1.8 *
**.	LR_106	*	235969.41	848294.06	1.8 *
**.	LR_107	*	235971.31	848289.44	1.8 *
**.	LR_108	*	235973.23	848284.81	1.8 *
**.	LR_109	*	235988.36	848288.12	1.8 *
**.	LR_110	*	235986.45	848292.75	1.8 *
**.	LR_111	*	235984.55	848297.38	1.8 *
**.	LR_112	*	235982.62	848302.00	1.8 *
**.	LR_113	*	235980.70	848306.62	1.8 *
**.	LR_114	*	235978.80	848311.25	1.8 *
**.	LR_115	*	235976.89	848315.88	1.8 *
**.	LR_116	*	235974.98	848320.50	1.8 *
**.	LR_117	*	235973.06	848325.12	1.8 *
**.	LR_118	*	235971.16	848329.75	1.8 *
**.	LR_119	*	235969.23	848334.38	1.8 *
**.	LR_120	*	235967.33	848339.00	1.8 *

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	*	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.3	0.3	0.5	0.6	0.7

```
  10.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3
  0.4    0.6    0.7    0.7
  20.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3
  0.4    0.6    0.7    0.8
  30.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2
  0.3    0.5    0.7    0.7
  40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2
  0.4    0.6    0.6    0.6
  50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2
  0.5    0.6    0.6    0.6
  60.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3
  0.6    0.7    0.7    0.7
  70.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3
  0.6    0.7    0.7    0.7
  80.  *    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.4
  0.6    0.6    0.6    0.6
  90.  *    0.7    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.5
  0.6    0.6    0.6    0.6
 100.  *    0.7    0.6    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.7    0.7    0.7    0.7
 110.  *    0.6    0.4    0.3    0.3    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.8    0.8    0.8    0.8
 120.  *    0.4    0.4    0.3    0.3    0.3    0.2    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.8
 0.8    0.8    0.8    0.8

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 MAX   *    0.7    0.6    0.3    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.8
 0.8    0.8    0.8    0.8
 DEGR. *     90    100    100    110    120    120      0      0      0      0      0      0      0      0      0    120
 110    110    110     20
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
130.	*	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.8	0.9	0.9	0.9	0.9
140.	*	0.2	0.2	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	1.	1.	0.9	0.9	0.9
150.	*	0.4	0.5	0.5	0.5	0.5	0.6	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.5	0.8	0.9	0.9	0.9	0.9
160.	*	0.7	0.9	0.8	0.8	0.7	0.8	0.8	0.7	0.6	0.8	0.8	0.8	0.8	0.8	0.8	0.5	0.6	0.5	0.5	0.6
170.	*	0.8	0.9	0.8	0.8	0.9	0.8	0.9	1.	1.	0.8	0.9	0.9	0.9	0.8	0.9	0.1	0.1	0.1	0.2	0.3
180.	*	0.6	0.8	0.5	0.7	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.1	0.1	0.1	0.2	0.2
190.	*	0.6	0.7	0.6	0.6	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.9	0.9	0.9	0.1	0.1	0.1	0.1	0.1
200.	*	0.5	0.4	0.8	0.9	1.	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.1	0.1	0.1	0.1	0.1
210.	*	0.4	0.6	0.6	1.	1.	1.	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.1	0.1	0.1	0.1	0.1
220.	*	0.4	0.6	0.8	0.9	0.8	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.1	0.1	0.1	0.1	0.1
230.	*	0.5	0.6	1.	1.	0.8	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.1	0.1	0.1	0.1	0.1
240.	*	0.6	0.9	1.1	0.9	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.7	0.5	0.	0.	0.1	0.1	0.1
250.	*	0.7	1.	1.	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.5	0.	0.	0.	0.	0.
260.	*	1.	0.8	0.8	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.4	0.	0.	0.	0.	0.
270.	*	0.8	0.8	0.7	0.6	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.4	0.	0.	0.	0.	0.

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 280.  *    0.6    0.8    0.8    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.5    0.3     0.
 0.     0.     0.     0.
 290.  *    0.5    0.9    0.8    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.4    0.3     0.
 0.     0.     0.     0.
 300.  *    0.6    0.8    0.8    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.6    0.4    0.3     0.
 0.     0.     0.     0.
 310.  *    0.6    0.9    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.6    0.6    0.5    0.4    0.3    0.3     0.
 0.     0.     0.     0.
 320.  *    0.5    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.7    0.6    0.5    0.4    0.4    0.3    0.1
 0.1    0.1    0.1    0.2
 330.  *    0.5    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.6    0.5    0.5    0.5    0.4    0.5    0.4    0.2
 0.2    0.3    0.3    0.3
 340.  *    0.2    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.4
 0.4    0.5    0.6    0.6
 350.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.4
 0.4    0.5    0.6    0.8
 360.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.    0.3
 0.3    0.5    0.6    0.7

 ------*-------------------------------------------------------------------------------------------------------------------
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 MAX   *     1.     1.    1.1     1.     1.     1.    0.9     1.     1.    0.9    0.9    0.9    0.9    0.9    0.9     1.
 1.    0.9    0.9    0.9
 DEGR. *    260    250    240    210    200    210    170    170    170    190    170    170    170    190    170    140
 140    130    130    130
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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
*	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36

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 REC37  REC38  REC39  REC40

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   .  *    0.7    0.9     1.     1.     1.     1.     1.     1.    1.1    0.3    0.3    0.6    0.6    0.6    0.5    0.4
   0.4    0.4    0.3    0.2
  10.  *    0.8    0.8    0.9    0.9    0.9    0.9    0.9    0.9     1.    0.3    0.4    0.6    0.6    0.5    0.5    0.4
  0.4    0.4    0.2    0.2
  20.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.9     1.    0.3    0.6    0.6    0.6    0.5    0.4    0.4
  0.4    0.3    0.2    0.2
  30.  *    0.7    0.8    0.8    0.8    0.8    0.8    0.8    0.9     1.    0.4    0.6    0.6    0.5    0.5    0.4    0.4
  0.4    0.3    0.2    0.2
  40.  *    0.7    0.7    0.7    0.7    0.8    0.8    0.8    0.9     1.    0.5    0.5    0.6    0.6    0.5    0.5    0.5
  0.4    0.3    0.3    0.3
  50.  *    0.6    0.6    0.6    0.6    0.6    0.8    0.8     1.     1.    0.5    0.6    0.6    0.5    0.5    0.5    0.4
  0.4    0.3    0.3    0.3
  60.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.8     1.     1.    0.3    0.6    0.5    0.5    0.5    0.4    0.4
  0.3    0.3    0.3    0.3
  70.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.8     1.    0.8    0.2    0.4    0.4    0.4    0.4    0.4    0.3
  0.3    0.2    0.2    0.2
  80.  *    0.6    0.6    0.6    0.6    0.6    0.8    0.9     1.     1.    0.1    0.2    0.3    0.2    0.2    0.2    0.2
  0.2    0.2    0.2    0.1
  90.  *    0.6    0.6    0.7    0.7    0.7    0.8    1.1    1.2    1.1     0.    0.1    0.1    0.1    0.1    0.1    0.1
  0.1    0.1    0.1    0.1
 100.  *    0.7    0.7    0.7    0.8    0.9     1.    1.3    1.2    1.1     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 110.  *    0.8    0.8    0.9    0.9     1.    1.1    1.3    1.3    0.7     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 120.  *    0.8    0.9    0.9    0.9     1.    1.1    1.1    0.9    0.5     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 130.  *    0.9    0.9     1.     1.    0.9    1.1     1.    0.9    0.8     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 140.  *     1.    1.1    1.2    1.3    1.4    1.2    1.1    0.9    1.1     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 150.  *    0.9     1.    1.2    1.1     1.    0.9    0.8    0.9    1.1    0.2    0.1     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 160.  *    0.6    0.6    0.5    0.7    0.7    0.7    0.7    0.7    0.9    0.5    0.4    0.1    0.1    0.1    0.1    0.1
 0.     0.     0.     0.
 170.  *    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.5    0.4     1.    0.6    0.4    0.2    0.1    0.1    0.1
 0.1    0.1    0.1    0.1
```

```
180.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.3     1.    0.8    0.4    0.3    0.3    0.1    0.1
0.1    0.1    0.1    0.1
190.  *    0.1    0.1    0.2    0.2    0.2    0.2    0.3    0.3    0.5     1.    0.8    0.6    0.3    0.3    0.3    0.3
0.1    0.1    0.1    0.1
200.  *    0.1    0.1    0.1    0.1    0.2    0.2    0.3    0.3    0.5     1.    0.6    0.5    0.5    0.3    0.3    0.3
0.3    0.2    0.1    0.1
210.  *    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.5    0.6    0.5    0.5    0.5    0.4    0.3    0.3
0.3    0.3    0.3    0.2
220.  *    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.3    0.6    0.6    0.6    0.5    0.5    0.4    0.4    0.3
0.3    0.3    0.3    0.3
230.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.5    0.5    0.3    0.4    0.4    0.4    0.4    0.4
0.3    0.3    0.2    0.2
240.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.4    0.3    0.3    0.2    0.2    0.1    0.2    0.2
0.1    0.1    0.1    0.2
250.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.7    0.5    0.4    0.5    0.4    0.3    0.3
0.3    0.3    0.3    0.2
260.  *     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.3    0.9    0.7    0.6    0.6    0.5    0.5    0.2
0.4    0.4    0.4    0.4
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.1     1.    0.8    0.6    0.6    0.6    0.7    0.7
0.5    0.5    0.7    0.7
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.9    0.6    0.5    0.5    0.6    0.5    0.7
0.7    0.6    0.6    0.6
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.7    0.5    0.4    0.8    0.7    0.9    0.9
1.    0.9     1.    0.9
300.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.6    0.6    0.5    0.7    0.9     1.     1.
1.    0.9    0.9    0.7
310.  *     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.8    0.6    0.4    0.7    0.8    0.9    0.9
0.7    0.6    0.5    0.5
320.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.7    0.7    0.6    0.8    0.8    0.8    0.7
0.6    0.5    0.5    0.4
330.  *    0.4    0.4    0.4    0.4    0.6    0.6    0.6    0.6    0.7    0.6    0.5    0.5    0.8    0.7    0.7    0.6
0.5    0.5    0.5    0.4
340.  *    0.7    0.7    0.8    0.9    0.9    0.9    0.9    0.9     1.    0.4    0.3    0.5    0.7    0.7    0.7    0.5
0.4    0.4    0.4    0.2
350.  *    0.8    0.9    0.9    0.9     1.     1.    1.1    1.1    1.1    0.1    0.3    0.6    0.6    0.6    0.5    0.4
0.4    0.4    0.3    0.2
360.  *    0.7    0.9     1.     1.     1.     1.     1.     1.    1.1    0.3    0.3    0.6    0.6    0.6    0.5    0.4
0.4    0.4    0.3    0.2

------*-----------------------------------------------------------------------------------------------------------
```

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 ---------------------
MAX   *     1.    1.1    1.2    1.3    1.4    1.2    1.3    1.3    1.1     1.    0.8    0.6    0.8    0.9     1.     1.
1.    0.9     1.    0.9
DEGR. *    140    140    140    140    140    140    100    110      0    170    180      0    290    300    300    300
290    290    290    290
FF                                                                                                          PAGE   7

      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC41  REC42  REC43  REC44  REC45  REC46  REC47  REC48  REC49  REC50  REC51  REC52  REC53  REC54  REC55  REC56
REC57  REC58  REC59  REC60

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---------------------
   .  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
 10.  *    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 20.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 30.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 40.  *    0.3    0.3    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 50.  *    0.3    0.3    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 60.  *    0.2    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 70.  *    0.2    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.1    0.1    0.2    0.3
```

```
 80.  *    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2
 0.3    0.4    0.6    0.7
 90.  *    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.2    0.3    0.4    0.4
 0.5    0.7    0.8    0.9
100.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.2    0.2    0.3    0.3    0.4    0.5
0.6    0.9     1.    1.1
110.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.3    0.4    0.5    0.6
0.8     1.    1.1    1.1
120.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.3    0.4    0.5    0.6
0.8     1.    1.1    1.1
130.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.3    0.5    0.6    0.6
0.9    0.9    0.9    0.9
140.  *     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.2    0.4    0.5    0.5
0.8    0.9    0.9    0.9
150.  *     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.3    0.4    0.5    0.5
0.8    0.8    0.9    0.9
160.  *     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.2    0.3    0.5    0.5    0.5
0.9    0.9     1.     1.
170.  *    0.1     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.3    0.3    0.5    0.6    0.6    0.6
0.9    0.9    1.1    1.2
180.  *    0.1    0.1    0.1    0.1    0.1     0.     0.3    0.3    0.3    0.3    0.3    0.3    0.5    0.6    0.6    0.7
0.9    1.1    1.2    1.2
190.  *    0.1    0.1    0.1    0.1    0.1     0.     0.3    0.3    0.3    0.3    0.3    0.3    0.5    0.6    0.7    0.9
1.1    1.2    1.3    1.2
200.  *    0.1    0.1    0.1     0.     0.     0.1    0.2    0.2    0.2    0.3    0.3    0.4    0.7    0.8    0.8     1.
1.2    1.3    1.3    1.2
210.  *    0.1     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.3    0.5    0.8    0.9    0.9    0.9     1.
1.2    1.3    0.9    0.8
220.  *    0.1    0.1    0.1     0.     0.     0.2    0.3    0.3    0.3    0.3    0.5    0.7    0.8    0.8    0.9     1.
1.1    1.1     1.    0.6
230.  *    0.2    0.1    0.1    0.1    0.1     0.3    0.3    0.3    0.4    0.4    0.6    0.7    0.7    0.8    0.9    1.1
1.1    1.1    0.9    0.5
240.  *    0.2    0.2    0.2    0.2    0.2     0.3    0.4    0.4    0.4    0.6    0.6    0.7    0.7    0.7    0.8    1.1
1.2    1.2    0.9    0.6
250.  *    0.2    0.2    0.2    0.2    0.1     0.4    0.4    0.4    0.7    0.7    0.7    0.8    0.7    0.8    0.9    1.1
1.1    0.9    0.8    0.6
260.  *    0.4    0.4    0.4    0.4    0.4     0.4    0.4    0.4    0.5    0.5    0.6    0.6    0.5    0.6    0.5    0.6
0.6    0.6    0.7    0.8
270.  *    0.7    0.7    0.6    0.5    0.5     0.     0.     0.     0.2    0.2    0.2    0.3    0.2    0.3    0.4    0.5
0.4    0.4    0.4    0.5
```

```
 280.  *    0.6    0.6    0.4    0.4    0.4     0.     0.     0.     0.    0.1    0.2    0.2    0.3    0.3    0.3    0.3
 0.3    0.3    0.4    0.4
 290.  *    0.7    0.4    0.4    0.4    0.3     0.     0.     0.     0.    0.1    0.2    0.2    0.3    0.3    0.3    0.3
 0.3    0.3    0.3    0.4
 300.  *    0.5    0.5    0.4    0.4    0.4     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.3
 0.3    0.3    0.3    0.3
 310.  *    0.4    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2
 0.2    0.3    0.3    0.3
 320.  *    0.3    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.1    0.2    0.3
 330.  *    0.3    0.3    0.3    0.3    0.2     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.1    0.1    0.2
 340.  *    0.2    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.1    0.1
 350.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 360.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.7    0.7    0.6    0.5    0.5    0.4    0.4    0.4    0.7    0.7    0.7    0.8    0.9    0.9    0.9    1.1
 1.2    1.3    1.3    1.2
 DEGR. *    270    270    270    270    270    250    240    240    250    250    250    210    210    210    210    230
 200    200    190    170
```

FF PAGE 8

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR) *	CONCENTRATION (PPM)															
	REC61	REC62	REC63	REC64	REC65	REC66	REC67	REC68	REC69	REC70	REC71	REC72	REC73	REC74	REC75	REC76

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 REC77  REC78  REC79  REC80

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *     0.    0.7    0.5    0.4    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
   0.4    0.5    0.5    0.5
 10.  *     0.    0.8    0.5    0.3    0.3    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.5    0.5    0.5    0.5
 20.  *     0.    0.7    0.5    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.5    0.5    0.5    0.5
 30.  *     0.    0.7    0.5    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1    0.1    0.1     0.
 0.4    0.4    0.5    0.5
 40.  *     0.    0.6    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.1     0.     0.
 0.4    0.4    0.6    0.7
 50.  *     0.    0.6    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1     0.
 0.5    0.5    0.6    0.6
 60.  *    0.1    0.5    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1     0.     0.
 0.6    0.6    0.5    0.5
 70.  *    0.4    0.5    0.5    0.6    0.5    0.4    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.2    0.2    0.2
 0.5    0.6    0.6    0.6
 80.  *    0.8    0.6    0.5    0.4    0.3    0.3    0.4    0.2    0.3    0.3    0.3    0.3    0.4    0.5    0.5    0.5
 0.5    0.5    0.5    0.5
 90.  *    1.1    0.6    0.6    0.5    0.5    0.5    0.6    0.6    0.6    0.6    0.7    0.6    0.7    0.7    0.8    0.8
 0.2    0.2    0.2    0.3
100.  *    1.1    0.5    0.5    0.4    0.5    0.6    0.9    0.9    0.8     1.    0.9    0.8    0.9    0.9    0.9    0.9
0.1    0.1    0.1    0.2
110.  *    1.1    0.4    0.5    0.7    0.7    0.9    0.9    0.9     1.    0.9    0.8    0.7    0.8    0.8    0.9    0.9
0.1    0.1    0.1    0.1
120.  *    0.9    0.6     1.     1.     1.     1.     1.    1.1    0.9    0.8    0.7    0.6    0.6    0.7    0.6    0.6
0.     0.     0.     0.
130.  *    0.7    1.1    1.2    1.1     1.     1.    0.9    0.8    0.9    0.7    0.6    0.6    0.6    0.6    0.6    0.6
0.     0.     0.    0.1
140.  *    0.5    1.1     1.    1.1    0.9    0.9    0.9    0.7    0.5    0.5    0.6    0.6    0.6    0.6    0.6    0.6
0.     0.    0.1    0.1
150.  *    0.5    1.1    0.8    0.8    0.8    0.7    0.7    0.5    0.4    0.4    0.4    0.5    0.5    0.5    0.5    0.4
0.     0.     0.     0.
160.  *    0.7    0.7    0.8    0.7    0.7    0.6    0.5    0.4    0.3    0.3    0.3    0.4    0.4    0.5    0.5    0.4
0.     0.     0.     0.
170.  *    0.6    0.6    0.6    0.6    0.6    0.7    0.6    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.5    0.4
0.     0.     0.     0.
```

```
 180.  *    0.6    0.6    0.6    0.6    0.6    0.6    0.4    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.3
 0.     0.     0.     0.
 190.  *    0.7    0.6    0.6    0.6    0.6    0.5    0.5    0.4    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.3
 0.     0.     0.     0.
 200.  *    0.3    0.7    0.7    0.7    0.7    0.6    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.4    0.4    0.3
 0.     0.     0.     0.
 210.  *    0.3    0.7    0.7    0.7    0.7    0.5    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.4    0.4    0.4
 0.     0.     0.     0.
 220.  *    0.3    0.7    0.7    0.7    0.6    0.5    0.4    0.4    0.5    0.5    0.5    0.5    0.5    0.4    0.5    0.4
 0.     0.     0.     0.
 230.  *    0.5    0.8    0.8    0.7    0.7    0.5    0.6    0.6    0.6    0.6    0.5    0.5    0.4    0.5    0.5    0.4
 0.     0.     0.     0.
 240.  *    0.5    0.8    0.7    0.8    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.6    0.5
 0.     0.     0.     0.
 250.  *    0.7    0.7    0.7    0.6    0.6    0.6    0.5    0.5    0.5    0.6    0.5    0.5    0.5    0.6    0.5    0.6
 0.     0.     0.    0.1
 260.  *    0.7    0.4    0.4    0.4    0.4    0.5    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.5    0.5
 0.1    0.1    0.2    0.3
 270.  *    0.8    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.3    0.3    0.3
 0.2    0.2    0.4    0.5
 280.  *    0.5    0.1    0.1     0.     0.     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.3    0.3    0.5    0.5
 290.  *    0.5     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.3    0.3    0.5    0.5
 300.  *    0.5     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.3    0.4    0.5    0.5
 310.  *    0.4     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.2    0.4    0.5    0.5
 320.  *    0.5     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.2    0.4    0.4    0.4
 330.  *    0.3    0.3    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.2    0.4    0.4    0.4
 340.  *    0.1    0.6    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.
 0.2    0.4    0.5    0.5
 350.  *     0.    0.7    0.4    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.3    0.5    0.5    0.5
 360.  *     0.    0.7    0.5    0.4    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.4    0.5    0.5    0.5

------*-----------------------------------------------------------------------------------------------------------------
```

```
 ---------------------
MAX   *    1.1    1.1    1.2    1.1     1.     1.     1.    1.1     1.     1.    0.9    0.8    0.9    0.9    0.9    0.9
0.6    0.6    0.6    0.7
DEGR. *     90    130    130    130    120    120    120    120    110    100    100    100    100    100    100    100
60     60     40     40
```

FF PAGE 9

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

```
WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC81  REC82  REC83  REC84  REC85  REC86  REC87  REC88  REC89  REC90  REC91  REC92  REC93  REC94  REC95  REC96
REC97  REC98  REC99  REC100

------*-----------------------------------------------------------------------------------------------------------------
---------------------
   .  *    0.5    0.6    0.6    0.6    0.6    0.8    1.3    1.2    1.2    1.3    1.5    1.1    0.8    0.9    0.8    0.7
  0.8    0.8    0.8    0.9
 10.  *    0.5    0.6    0.6    0.6    0.8    1.1    1.4    1.3    1.2    1.2    1.3     1.    0.7    0.8    0.8    0.6
 0.7    0.9    0.8    0.9
 20.  *    0.5    0.6    0.7    0.8    0.9    1.1    1.4    1.4    1.2    1.3    1.3    0.6    0.6    0.6    0.6    0.5
 0.9    0.9    1.1    1.2
 30.  *    0.7    0.8    0.8    0.8    0.9    1.3    1.4    1.4    1.4    1.4    1.2    0.5    0.5    0.6    0.7    0.8
 0.9    0.9    1.1     1.
 40.  *    0.8    0.8    0.8    0.8    1.1    1.4    1.5    1.5    1.6    1.1     1.    0.5    0.5    0.8    0.8    1.1
 0.9     1.     1.    0.9
 50.  *    0.7    0.7    0.8    1.1    1.2    1.4    1.6    1.4    1.2    1.1     1.    0.7    0.7    0.9    0.8    0.9
 0.9    0.8    0.8    0.9
 60.  *    0.6    0.6    0.8    0.9     1.    1.4    1.4    1.3    1.1     1.    1.1    0.8    0.8    0.9     1.    0.9
 0.7    0.8    0.8    0.7
 70.  *    0.6    0.7    0.9    0.9    1.2    1.5    1.6    1.4    1.2     1.    1.1    0.8    0.8    0.6    0.8    0.7
 0.7    0.8    0.8    0.8
```

```
 80.  *    0.5    0.7    0.8    0.8    1.1    1.3    1.3    1.2     1.    0.7    0.8    0.7    0.8    0.6    0.7    0.7
 0.8    0.8    0.8    0.7
 90.  *    0.3    0.4    0.6    0.6    0.7    0.7    0.9    0.7    0.5    0.6    0.5    0.5    0.5    0.7    0.7    0.8
 0.8    0.8    0.7    0.8
100.  *    0.2    0.2    0.3    0.3    0.5    0.5    0.4    0.3    0.3    0.5    0.4    0.6    0.8    0.7    0.9    0.9
0.9    0.9    0.8    0.8
110.  *    0.1    0.1    0.1    0.3    0.3    0.3    0.4    0.4    0.4    0.5    0.7    0.7    0.8    0.7     1.     1.
1.     1.    0.9    0.9
120.  *    0.1    0.2    0.2    0.2    0.2    0.3    0.3    0.4    0.4    0.5    0.6    0.7    0.7     1.     1.     1.
1.    0.9    0.9    0.9
130.  *    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.3    0.4    0.4    0.6    0.7    0.9    1.2    1.2    1.2
1.1    1.1    1.1    0.9
140.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.4    0.5    0.7    0.9    1.3    1.2     1.
1.     1.    0.9    0.9
150.  *     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.3    0.6    0.7    0.9    0.9    0.9
0.9    0.9    0.9    0.8
160.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.2    0.3    0.3    0.6    0.6    0.6
0.6    0.5    0.5    0.5
170.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.4    0.4    0.3
0.3    0.3    0.3    0.3
180.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1
0.1    0.1    0.1    0.1
190.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1
0.1    0.1    0.1    0.1
200.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
210.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
240.  *     0.     0.     0.     0.     0.     0.     0.1    0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
250.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.4    0.3    0.3    0.2    0.2    0.1     0.     0.     0.     0.
0.     0.     0.     0.
260.  *    0.3    0.3    0.4    0.4    0.5    0.6    0.7    0.8    0.7    0.6    0.6    0.4    0.2    0.1    0.1     0.
0.     0.     0.     0.
270.  *    0.5    0.5    0.6    0.6    0.7    0.8     1.    1.1     1.     1.    1.1    0.8    0.7    0.2    0.1    0.1
0.1    0.1    0.1     0.
```

```
 280.  *    0.6    0.6    0.6    0.7    0.7    0.9    1.2    1.2    1.2    1.1    1.3    0.9    0.9    0.6    0.2    0.2
 0.1    0.1    0.1    0.1
 290.  *    0.5    0.6    0.6    0.6    0.7    0.8    1.1    1.2    1.1    1.1    1.2     1.    0.8    0.5    0.4    0.3
 0.1    0.1    0.1    0.1
 300.  *    0.5    0.5    0.6    0.6    0.6    0.8    1.1    1.2    1.2     1.    1.1    0.9    0.9    0.7    0.5    0.2
 0.2    0.2    0.2    0.2
 310.  *    0.5    0.5    0.5    0.5    0.6    0.7     1.    1.1     1.     1.     1.    0.9    0.8    0.6    0.3    0.3
 0.3    0.3    0.3    0.3
 320.  *    0.5    0.5    0.5    0.5    0.5    0.7     1.    1.1     1.    0.9     1.    0.9    0.7    0.5    0.5    0.4
 0.3    0.3    0.3    0.3
 330.  *    0.4    0.5    0.5    0.5    0.5    0.6     1.    1.1     1.     1.    1.1    1.2    0.8     1.    0.9     1.
 0.7    0.7    0.8    0.7
 340.  *    0.5    0.6    0.6    0.6    0.6    0.7    1.2    1.1     1.    1.2    1.3    1.2    1.1     1.    0.9    0.9
 0.8    0.9    0.9     1.
 350.  *    0.5    0.6    0.6    0.6    0.6    0.7    1.2     1.    1.2    1.3    1.4    1.4    1.2     1.     1.     1.
 0.9     1.     1.    1.2
 360.  *    0.5    0.6    0.6    0.6    0.6    0.8    1.3    1.2    1.2    1.3    1.5    1.1    0.8    0.9    0.8    0.7
 0.8    0.8    0.8    0.9

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.8    0.8    0.9    1.1    1.2    1.5    1.6    1.5    1.6    1.4    1.5    1.4    1.2    1.3    1.2    1.2
 1.1    1.1    1.1    1.2
 DEGR. *     40     30     70     50     50     70     50     40     40     30      0    350    350    140    130    130
 130    130     20     20
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC101 REC102 REC103 REC104 REC105 REC106 REC107 REC108 REC109 REC110 REC111 REC112 REC113 REC114 REC115 REC116
```

REC117

.	*	0.9	1.	1.1	1.1	1.1	0.	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.3
10.	*	1.	1.1	1.1	1.1	1.1	0.	0.	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.4	0.3	0.4
20.	*	1.1	1.1	0.9	1.	1.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.4
30.	*	1.	0.8	0.8	0.8	0.8	0.	0.	0.	0.	0.	0.	0.1	0.1	0.2	0.3	0.3	0.3
40.	*	0.8	0.8	0.8	0.8	0.8	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.3	0.4
50.	*	0.8	0.8	0.8	0.8	0.8	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.4
60.	*	0.7	0.8	0.8	0.8	0.8	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2
70.	*	0.8	0.8	0.8	0.8	0.7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2
80.	*	0.7	0.8	0.8	0.8	0.6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90.	*	0.8	0.8	0.8	0.6	0.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100.	*	0.8	0.8	0.8	0.6	0.4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
110.	*	0.9	0.9	0.7	0.6	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
120.	*	1.	0.9	0.8	0.7	0.4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.
130.	*	0.9	0.8	0.8	0.5	0.4	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1
140.	*	0.8	0.8	0.6	0.5	0.3	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3
150.	*	0.7	0.6	0.6	0.5	0.3	0.1	0.1	0.2	0.2	0.2	0.4	0.4	0.4	0.4	0.5	0.5	0.5
160.	*	0.5	0.4	0.5	0.4	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.8	0.9	1.	1.1	1.1
170.	*	0.3	0.3	0.3	0.2	0.1	0.3	0.4	0.5	0.6	0.9	0.9	1.	1.1	1.1	1.2	1.2	1.4
180.	*	0.1	0.1	0.1	0.1	0.	0.3	0.4	0.5	0.8	0.8	0.9	1.1	1.2	1.3	1.4	1.4	1.4
190.	*	0.1	0.1	0.1	0.1	0.	0.3	0.4	0.7	0.9	0.9	1.	1.	1.	1.2	1.3	1.4	1.3
200.	*	0.	0.1	0.1	0.	0.	0.2	0.4	0.7	0.9	1.	1.	1.	1.1	1.2	1.2	1.2	1.1
210.	*	0.	0.	0.	0.	0.	0.2	0.5	0.7	0.9	0.9	0.9	0.9	1.1	1.2	1.2	1.2	1.
220.	*	0.	0.	0.	0.	0.	0.3	0.6	0.7	0.8	0.8	0.8	0.8	0.9	1.	1.1	1.1	1.
230.	*	0.	0.	0.	0.	0.	0.4	0.7	0.8	0.8	0.8	0.8	0.8	1.	1.	1.	1.1	0.7
240.	*	0.	0.	0.	0.	0.	0.4	0.7	0.8	0.8	0.8	0.8	0.9	1.	1.	1.	1.	0.7
250.	*	0.	0.	0.	0.	0.	0.7	0.8	0.8	0.8	0.8	0.8	0.9	1.	1.	1.	1.	0.4
260.	*	0.	0.	0.	0.	0.	0.7	0.8	0.8	0.8	0.8	0.8	0.9	1.	1.	1.1	1.1	0.6
270.	*	0.	0.	0.	0.	0.	0.8	0.8	0.8	0.8	0.8	0.8	1.1	1.1	1.1	1.1	1.1	0.9
280.	*	0.1	0.1	0.1	0.	0.	0.8	0.9	0.9	0.9	0.9	1.	1.1	1.1	1.1	1.4	1.2	1.
290.	*	0.1	0.1	0.1	0.1	0.1	1.	1.	1.	1.	1.	1.1	1.3	1.4	1.4	1.3	1.2	0.8
300.	*	0.2	0.2	0.2	0.2	0.2	1.	1.	1.	1.1	1.2	1.3	1.4	1.4	1.4	1.4	1.2	0.9
310.	*	0.2	0.2	0.2	0.2	0.2	1.1	1.1	1.1	1.2	1.2	1.4	1.4	1.4	1.5	1.3	0.8	1.
320.	*	0.4	0.3	0.3	0.3	0.3	1.2	1.3	1.3	1.2	1.2	1.5	1.5	1.5	1.3	1.	0.8	1.
330.	*	0.5	0.4	0.5	0.5	0.5	1.	1.	1.2	1.1	1.1	1.3	1.4	1.4	1.2	0.9	0.8	0.8
340.	*	0.9	0.8	0.9	1.	0.8	0.5	0.7	0.7	0.8	0.7	0.7	0.8	0.7	0.7	0.7	0.5	0.6
350.	*	1.	1.1	1.	1.1	1.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2
360.	*	0.9	1.	1.1	1.1	1.1	0.	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.3

MAX	*	1.1	1.1	1.1	1.1	1.2	1.2	1.3	1.3	1.2	1.2	1.5	1.5	1.5	1.5	1.4	1.4	1.4
DEGR.	*	20	10	0	0	350	320	320	320	310	300	320	320	320	310	180	180	170

THE HIGHEST CONCENTRATION OF 1.60 ppm OCCURRED AT RECEPTOR REC89.

FF

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*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/11/2012 11:33:07 AM
** File: F:\2975 FirstLight\Microscale\Worst\12 Hart & County LOS\2022NBAM.ou2
**
*********************************************


                    CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                    PAGE  1

     JOB: First Light - Taunton - Hart & County Sts- 2022 No Build AM             RUN: CAL3QHC
     RUN

     DATE : 12/11/12
     TIME : 11:33: 4

        The MODE flag has been set to C for calculating CO averages.

      SITE & METEOROLOGICAL VARIABLES
      -------------------------------
      VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 100. CM
       U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  0.0 PPM

      LINK VARIABLES
      --------------
                 LINK DESCRIPTION               *              LINK COORDINATES (M)              *    LENGTH  BRG TYPE
                 VPH    EF      H     W    V/C QUEUE
                                                *       X1          Y1            X2          Y2    *     (M)
                                               (DEG)            (G/MI)   (M)   (M)       (VEH)

     ------------------------------------------*-------------------------------------------------*------------------------
     ---------------------------------
      1. Hart EB TL                            *  235870.27    848335.69   235946.16    848348.19 *      77.    81. AG
      230.   8.5   0.0    9.4
      2. Hart EB TL QUEUE                      *  235946.16    848348.19   235907.95    848341.88 *      39.   261. AG
      94. 100.0   0.0    3.4 0.67   6.5
      3. Hart EB RL                            *  235910.48    848343.12   235945.62    848345.50 *      35.    86. AG
```

277. 8.5 0.0 9.0
4. Hart EB RL QUEUE * 235945.62 848345.50 235909.70 848343.06 * 36. 266. AG
73. 100.0 0.0 3.0 0.41 6.0
5. Hart WB LT * 236039.62 848367.12 235970.39 848354.56 * 70. 260. AG
225. 8.5 0.0 9.4
6. Hart WB LT QUEUE * 235970.39 848354.56 236007.66 848361.31 * 38. 80. AG
94. 100.0 0.0 3.4 0.65 6.3
7. Hart WB RL * 236019.66 848365.25 235969.06 848357.75 * 51. 262. AG
104. 8.5 0.0 9.0
8. Hart WB RL QUEUE * 235969.06 848357.75 235983.12 848359.81 * 14. 82. AG
76. 100.0 0.0 3.0 0.17 2.4
9. 140 NB L * 235982.64 848282.94 235962.94 848336.75 * 57. 340. AG
132. 8.5 0.0 9.4
10. 140 NB L QUEUE * 235962.94 848336.75 235972.48 848310.69 * 28. 160. AG
106. 100.0 0.0 3.4 0.84 4.6
11. 140 NB TRL * 235983.98 848285.06 235965.06 848337.00 * 55. 340. AG
695. 8.5 0.0 9.0
12. 140 NB TRL QUEUE * 235965.06 848337.00 236440.25 847032.69 * 1388. 160. AG
98. 100.0 0.0 3.0 2.42 231.4
13. 140 SB LL * 235919.00 848421.94 235949.36 848359.12 * 70. 154. AG
117. 8.5 0.0 9.4
14. 140 SB LL QUEUE * 235949.36 848359.12 235892.61 848476.56 * 130. 334. AG
111. 100.0 0.0 3.4 1.36 21.7
15. 140 SB TR * 235919.53 848419.00 235945.62 848359.38 * 65. 156. AG
483. 8.5 0.0 9.4
16. 140 SB TR QUEUE * 235945.62 848359.38 235573.80 849209.00 * 927. 336. AG
103. 100.0 0.0 3.4 2.25 154.6
17. Hart EB OUTBOUND * 235965.73 848350.19 236039.41 848363.12 * 75. 80. AG
384. 8.5 0.0 9.4
18. Hart WB OUTBOUND * 235941.72 848352.06 235869.94 848338.81 * 73. 260. AG
271. 8.5 0.0 9.4
19. 140 NB OUTBOUND * 235952.52 848359.88 235923.64 848423.31 * 70. 336. AG
762. 8.5 0.0 9.4
20. 140 SB OUTBOUND * 235956.02 848338.31 235978.42 848283.25 * 59. 158. AG
846. 8.5 0.0 9.4
21. EBL * 235946.53 848348.12 235953.55 848359.31 * 13. 32. AG
38. 9.4 0.0 9.0
22. EBT * 235946.27 848348.31 235965.38 848350.44 * 19. 84. AG
192. 8.5 0.0 9.0
23. EBR * 235944.44 848346.44 235956.19 848338.50 * 14. 124. AG

277. 10.3 0.0 9.0
24. WBL * 235969.30 848354.88 235956.00 848339.56 * 20. 221. AG
99. 9.4 0.0 9.0
25. WBT * 235969.11 848354.62 235942.53 848351.69 * 27. 264. AG
126. 8.5 0.0 9.0
26. WBR * 235967.92 848357.19 235952.72 848359.31 * 15. 278. AG
104. 10.3 0.0 9.0
27. NBL * 235962.92 848337.50 235942.34 848352.00 * 25. 305. AG
132. 9.4 0.0 9.0
28. NBT * 235964.83 848337.69 235952.81 848359.44 * 25. 331. AG
620. 8.5 0.0 9.0
29. NBR * 235964.45 848338.56 235967.66 848350.31 * 12. 15. AG
75. 10.3 0.0 9.0
30. SBL * 235949.27 848359.25 235965.19 848350.25 * 18. 119. AG
117. 9.4 0.0 9.0
31. SBT * 235945.70 848359.44 235956.09 848338.94 * 23. 153. AG
470. 8.5 0.0 9.0
32. SBR * 235946.34 848359.62 235939.53 848350.81 * 11. 218. AG
13. 10.3 0.0 9.0

FF

JOB: First Light - Taunton - Hart & County Sts- 2022 No Build AM RUN: CAL3QHC
RUN

DATE : 12/11/12
TIME : 11:33: 4

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Hart EB TL QUEUE	*	132	101	5.0	230	1900	45.89	2	3
4. Hart EB RL QUEUE	*	132	78	5.0	277	1900	45.89	2	3
6. Hart WB LT QUEUE	*	132	101	5.0	225	1900	45.89	2	3
8. Hart WB RL QUEUE	*	132	82	5.0	104	1900	45.89	2	3
10. 140 NB L QUEUE	*	132	114	5.0	132	1900	45.89	2	3

12. 140 NB TRL QUEUE	*	132	105	5.0	695	1900	45.89	2	3
14. 140 SB LL QUEUE	*	132	119	5.0	117	1900	45.89	2	3
16. 140 SB TR QUEUE	*	132	110	5.0	483	1900	45.89	2	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235961.95	848360.62	1.8	*
2. LR_2	*	235956.00	848363.88	1.8	*
3. LR_3	*	235953.88	848368.38	1.8	*
4. LR_4	*	235951.77	848372.94	1.8	*
5. LR_5	*	235949.66	848377.50	1.8	*
6. LR_6	*	235947.55	848382.00	1.8	*
7. LR_7	*	235945.42	848386.50	1.8	*
8. LR_8	*	235943.31	848391.06	1.8	*
9. LR_9	*	235941.19	848395.56	1.8	*
10. LR_10	*	235939.06	848400.12	1.8	*
11. LR_11	*	235936.95	848404.62	1.8	*
12. LR_12	*	235934.84	848409.19	1.8	*
13. LR_13	*	235932.73	848413.69	1.8	*
14. LR_14	*	235930.61	848418.25	1.8	*
15. LR_15	*	235928.50	848422.75	1.8	*
16. LR_16	*	235913.59	848419.25	1.8	*
17. LR_17	*	235915.72	848414.69	1.8	*
18. LR_18	*	235917.83	848410.19	1.8	*
19. LR_19	*	235919.95	848405.62	1.8	*
20. LR_20	*	235922.06	848401.12	1.8	*
21. LR_21	*	235924.19	848396.56	1.8	*
22. LR_22	*	235926.30	848392.06	1.8	*
23. LR_23	*	235928.41	848387.50	1.8	*
24. LR_24	*	235930.52	848383.00	1.8	*
25. LR_25	*	235932.64	848378.50	1.8	*
26. LR_26	*	235934.75	848373.94	1.8	*
27. LR_27	*	235936.88	848369.44	1.8	*
28. LR_28	*	235938.98	848364.88	1.8	*
29. LR_29	*	235941.09	848360.31	1.8	*
30. LR_31	*	235969.44	848342.38	1.8	*
31. LR_32	*	235970.98	848345.12	1.8	*

32. LR_33	*	235975.58	848347.31	1.8 *
33. LR_34	*	235980.50	848348.19	1.8 *
34. LR_35	*	235985.42	848349.12	1.8 *
35. LR_36	*	235990.34	848350.00	1.8 *
36. LR_37	*	235995.27	848350.94	1.8 *

RECEPTOR	*	X	Y	Z *
	*	COORDINATES (M)		*
37. LR_38	*	236000.19	848351.81	1.8 *
38. LR_39	*	236005.09	848352.69	1.8 *
39. LR_40	*	236010.02	848353.62	1.8 *
40. LR_41	*	236014.94	848354.50	1.8 *
41. LR_42	*	236019.84	848355.38	1.8 *
42. LR_43	*	236024.77	848356.31	1.8 *
43. LR_44	*	236029.69	848357.19	1.8 *
44. LR_45	*	236034.61	848358.12	1.8 *
45. LR_46	*	236039.53	848359.00	1.8 *
46. LR_47	*	236041.47	848373.19	1.8 *
47. LR_48	*	236036.55	848372.31	1.8 *
48. LR_49	*	236031.62	848371.44	1.8 *
49. LR_50	*	236026.70	848370.50	1.8 *
50. LR_51	*	236021.80	848369.62	1.8 *
51. LR_52	*	236016.88	848368.69	1.8 *
52. LR_53	*	236011.95	848367.81	1.8 *
53. LR_54	*	236007.05	848366.94	1.8 *
54. LR_55	*	236002.12	848366.00	1.8 *
55. LR_56	*	235997.20	848365.12	1.8 *
56. LR_57	*	235992.28	848364.25	1.8 *
57. LR_58	*	235987.38	848363.31	1.8 *
58. LR_59	*	235982.45	848362.44	1.8 *
59. LR_60	*	235977.53	848361.50	1.8 *
60. LR_61	*	235972.61	848360.62	1.8 *
61. LR_62	*	235967.69	848359.75	1.8 *
62. LR_64	*	235938.45	848355.44	1.8 *
63. LR_65	*	235933.53	848354.56	1.8 *
64. LR_66	*	235928.59	848353.69	1.8 *

65. LR_67	*	235923.69	848352.88	1.8 *
66. LR_68	*	235918.75	848352.00	1.8 *
67. LR_69	*	235913.83	848351.12	1.8 *
68. LR_70	*	235908.91	848350.25	1.8 *
69. LR_71	*	235903.97	848349.44	1.8 *
70. LR_72	*	235899.05	848348.56	1.8 *
71. LR_73	*	235894.12	848347.69	1.8 *
72. LR_74	*	235889.20	848346.88	1.8 *
73. LR_75	*	235884.27	848346.00	1.8 *
74. LR_76	*	235879.34	848345.12	1.8 *
75. LR_77	*	235874.42	848344.25	1.8 *
76. LR_78	*	235869.48	848343.44	1.8 *
77. LR_79	*	235871.02	848332.75	1.8 *
78. LR_80	*	235875.95	848333.56	1.8 *
79. LR_81	*	235880.88	848334.44	1.8 *
80. LR_82	*	235885.80	848335.31	1.8 *
81. LR_83	*	235890.73	848336.12	1.8 *
82. LR_84	*	235895.66	848337.00	1.8 *
83. LR_85	*	235900.58	848337.88	1.8 *
84. LR_86	*	235905.50	848338.75	1.8 *
85. LR_87	*	235910.44	848339.56	1.8 *
86. LR_88	*	235915.36	848340.44	1.8 *
87. LR_89	*	235920.28	848341.31	1.8 *
88. LR_90	*	235925.38	848341.50	1.8 *
89. LR_91	*	235930.12	848341.56	1.8 *
90. LR_92	*	235935.22	848341.44	1.8 *
91. LR_93	*	235940.47	848342.31	1.8 *
92. LR_94	*	235945.70	848340.75	1.8 *
93. LR_96	*	235948.52	848339.25	1.8 *

FF

JOB: First Light - Taunton - Hart & County Sts- 2022 No Build AM RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
94. LR_97	*	235952.20	848335.62	1.8 *
95. LR_98	*	235954.11	848331.00	1.8 *
96. LR_99	*	235956.02	848326.38	1.8 *
97. LR_100	*	235957.94	848321.75	1.8 *

98.	LR_101	*	235959.84	848317.12	1.8 *
99.	LR_102	*	235961.77	848312.50	1.8 *
**.	LR_103	*	235963.67	848307.88	1.8 *
**.	LR_104	*	235965.58	848303.25	1.8 *
**.	LR_105	*	235967.50	848298.69	1.8 *
**.	LR_106	*	235969.41	848294.06	1.8 *
**.	LR_107	*	235971.31	848289.44	1.8 *
**.	LR_108	*	235973.23	848284.81	1.8 *
**.	LR_109	*	235988.36	848288.12	1.8 *
**.	LR_110	*	235986.45	848292.75	1.8 *
**.	LR_111	*	235984.55	848297.38	1.8 *
**.	LR_112	*	235982.62	848302.00	1.8 *
**.	LR_113	*	235980.70	848306.62	1.8 *
**.	LR_114	*	235978.80	848311.25	1.8 *
**.	LR_115	*	235976.89	848315.88	1.8 *
**.	LR_116	*	235974.98	848320.50	1.8 *
**.	LR_117	*	235973.06	848325.12	1.8 *
**.	LR_118	*	235971.16	848329.75	1.8 *
**.	LR_119	*	235969.23	848334.38	1.8 *
**.	LR_120	*	235967.33	848339.00	1.8 *

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	* 0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.7	0.7	0.8	0.9	1.

```
 10.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.6    0.8    0.9    0.9
 20.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.6    0.8    0.9     1.
 30.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.7    0.8    0.9     1.
 40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.8    0.8    0.9    0.9
 50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.8    0.8    0.9    0.8
 60.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.8    0.8    0.8    0.8
 70.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.7
 0.8    0.9    0.8    0.8
 80.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.7
 0.9    0.9    0.9    0.8
 90.  *    0.5    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.8
 0.9    0.9    0.9    0.9
100.  *    0.6    0.3    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.9
0.9    0.9    0.9    0.9
110.  *    0.5    0.3    0.3    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.9
1.     1.     1.     1.
120.  *    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.9
1.     1.     1.     1.

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MAX   *    0.6    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.9
1.     1.     1.     1.
DEGR. *    100     90    110    120    110      0      0      0      0      0      0      0      0      0      0    100
110    110    110      0
```

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
130.	*	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	1.	1.	1.1	1.1	1.1
140.	*	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.1	1.1	1.2	1.2	1.2
150.	*	0.3	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.9	0.9	0.9	0.9	0.9
160.	*	0.7	0.8	0.7	0.8	0.8	0.8	0.9	0.7	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.5	0.5	0.5	0.5	0.5
170.	*	0.6	0.7	0.8	0.8	0.8	0.7	0.7	0.9	0.9	0.9	0.9	1.	1.	1.	1.	0.2	0.2	0.2	0.2	0.2
180.	*	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.9	1.	1.	1.	1.	0.	0.	0.	0.	0.
190.	*	0.4	0.5	0.4	0.4	0.9	0.8	0.9	0.9	0.9	1.	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
200.	*	0.4	0.3	0.6	0.8	0.9	1.	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.	0.	0.	0.	0.
210.	*	0.3	0.4	0.6	0.8	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.	0.	0.	0.	0.
220.	*	0.2	0.5	0.8	0.8	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.	0.	0.	0.	0.
230.	*	0.4	0.6	0.8	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.	0.	0.	0.	0.
240.	*	0.4	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.	0.	0.	0.	0.
250.	*	0.5	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.	0.	0.	0.	0.
260.	*	0.5	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.	0.	0.	0.	0.
270.	*	0.4	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.	0.	0.	0.	0.

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 280.  *    0.5    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.5     0.
 0.     0.     0.     0.
 290.  *    0.6    0.9    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.6    0.5     0.
 0.     0.     0.     0.
 300.  *    0.7    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.7    0.6     0.
 0.     0.     0.     0.
 310.  *    0.7    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.7    0.7    0.6     0.
 0.     0.     0.     0.
 320.  *    0.7    1.1    1.1    1.1    1.1    1.1    1.1     1.     1.     1.    0.9    0.9    0.7    0.7    0.6    0.1
 0.1    0.1    0.1    0.1
 330.  *    0.6     1.    0.9    0.9    0.9    0.9    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.6    0.5    0.3
 0.4    0.4    0.5    0.5
 340.  *    0.3    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.3    0.7
 0.7    0.8    0.8    0.8
 350.  *     0.    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.7
 0.7    0.8    0.8    0.9
 360.  *     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.    0.7
 0.7    0.8    0.9     1.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.7    1.1    1.1    1.1    1.1    1.1    1.1     1.     1.     1.    0.9     1.     1.     1.     1.    1.1
 1.1    1.2    1.2    1.2
 DEGR. *    160    320    320    320    320    320    320    320    320    190    170    170    170    170    170    140
 140    140    140    140
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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
*	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36

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 REC37  REC38  REC39  REC40

------*-------------------------------------------------------------------------------------------------------------------
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   .  *     1.     1.    1.1    1.1    1.1    1.1    1.1    1.1    1.2    0.3    0.3    0.5    0.5    0.4    0.4    0.4
   0.4    0.4    0.2    0.2
  10.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    0.3    0.3    0.5    0.5    0.4    0.4    0.4
  0.4    0.3    0.2    0.2
  20.  *     1.     1.     1.     1.     1.     1.     1.    1.1    1.1    0.3    0.4    0.5    0.4    0.4    0.4    0.4
  0.4    0.3    0.2    0.2
  30.  *     1.     1.     1.     1.     1.     1.     1.     1.    0.9    0.4    0.5    0.5    0.4    0.4    0.4    0.4
  0.3    0.2    0.2    0.2
  40.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.9    0.4    0.5    0.4    0.4    0.4    0.4    0.4
  0.3    0.2    0.2    0.2
  50.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.4    0.4    0.5    0.5    0.5    0.5    0.4
  0.4    0.3    0.3    0.3
  60.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.3    0.5    0.5    0.5    0.4    0.4    0.4
  0.3    0.3    0.3    0.3
  70.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.2    0.4    0.4    0.4    0.4    0.4    0.3
  0.2    0.2    0.2    0.2
  80.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.1    0.1    0.3    0.2    0.2    0.2    0.2
  0.1    0.1    0.1    0.1
  90.  *    0.9    0.8    0.8    0.8    0.8    0.8    0.8    0.8     1.     0.    0.1    0.1    0.1    0.1    0.1    0.1
  0.1    0.1    0.1    0.1
 100.  *     1.     1.     1.     1.     1.    1.1    0.9    0.9    0.9     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 110.  *     1.     1.     1.    1.1    1.1    1.1    0.9    0.9    0.5     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 120.  *     1.     1.     1.     1.     1.    0.9    0.9    0.8    0.4     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 130.  *    1.1    1.1    1.1    1.1    0.8    0.9     1.    0.7    0.7     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 140.  *    1.1     1.    0.9    0.9     1.    1.2    1.1    0.8    0.7     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 150.  *     1.     1.    0.8    0.7     1.    1.1    0.8    0.8    0.6    0.2    0.1    0.1    0.1     0.     0.     0.
 0.     0.     0.     0.
 160.  *    0.4    0.4    0.5    0.4    0.4    0.6    0.7    0.6    0.5    0.6    0.4    0.2    0.1    0.1    0.1    0.1
 0.1    0.1    0.1    0.1
 170.  *    0.2    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.5    0.8    0.7    0.3    0.2    0.2    0.1    0.1
 0.1    0.1    0.1    0.1
```

```
180.   *    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.9    0.7    0.5    0.4    0.2    0.1    0.1
0.1    0.1    0.1    0.1
190.   *     0.    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.9    0.8    0.5    0.4    0.3    0.2    0.1
0.1    0.1    0.1    0.1
200.   *     0.     0.     0.    0.1    0.2    0.2    0.2    0.3    0.3    0.8    0.7    0.5    0.4    0.4    0.3    0.3
0.2    0.1    0.1    0.1
210.   *     0.     0.     0.     0.    0.1    0.2    0.2    0.3    0.4    0.7    0.5    0.4    0.4    0.4    0.4    0.3
0.3    0.3    0.1    0.1
220.   *     0.     0.     0.     0.     0.    0.1    0.2    0.3    0.4    0.7    0.5    0.4    0.4    0.4    0.4    0.4
0.4    0.3    0.3    0.2
230.   *     0.     0.     0.     0.     0.     0.     0.    0.3    0.4    0.5    0.3    0.4    0.4    0.4    0.4    0.4
0.4    0.4    0.3    0.2
240.   *     0.     0.     0.     0.     0.     0.     0.    0.1    0.3    0.3    0.2    0.2    0.3    0.2    0.3    0.3
0.3    0.3    0.2    0.1
250.   *     0.     0.     0.     0.     0.     0.     0.     0.    0.2    0.2    0.2    0.1    0.1    0.2    0.1    0.1
0.1    0.1    0.1    0.1
260.   *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.4    0.5    0.4    0.3    0.3    0.2
0.1    0.2    0.3    0.3
270.   *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.4    0.5    0.4    0.3    0.4    0.4
0.3    0.3    0.3    0.5
280.   *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.4    0.4    0.3    0.3    0.3    0.4
0.6    0.6    0.5    0.5
290.   *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.4    0.2    0.4    0.5    0.5    0.9    0.9
0.9    0.8    0.8    0.8
300.   *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.4    0.5    0.5    0.8    0.8    0.8
0.7    0.7    0.7    0.6
310.   *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.6    0.7    0.6    0.7    0.8    0.8    0.8
0.7    0.6    0.6    0.5
320.   *    0.1    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.7    0.8    0.7    0.8    0.8    0.7    0.6
0.6    0.5    0.5    0.4
330.   *    0.5    0.6    0.6    0.6    0.6    0.7    0.7    0.7    0.7    0.7    0.5    0.7    0.6    0.7    0.5    0.5
0.5    0.5    0.4    0.3
340.   *    0.8     1.    1.1    1.1    1.1    1.1    1.1    1.1    1.2    0.4    0.4    0.5    0.6    0.6    0.5    0.4
0.4    0.4    0.3    0.2
350.   *    1.1    1.1    1.1    1.1    1.1    1.1    1.3    1.3    1.3    0.1    0.3    0.5    0.5    0.5    0.4    0.4
0.4    0.4    0.3    0.2
360.   *     1.     1.    1.1    1.1    1.1    1.1    1.1    1.1    1.2    0.3    0.3    0.5    0.5    0.4    0.4    0.4
0.4    0.4    0.2    0.2

------*-------------------------------------------------------------------------------------------------------------
```

```
 ---------------------
MAX   *    1.1    1.1    1.1    1.1    1.1    1.2    1.3    1.3    1.3    0.9    0.8    0.7    0.8    0.8    0.9    0.9
0.9    0.8    0.8    0.8
DEGR. *     10     10      0      0      0    140    350    350    350    180    190    320    320    300    290    290
290    290    290    290
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

```
WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC41  REC42  REC43  REC44  REC45  REC46  REC47  REC48  REC49  REC50  REC51  REC52  REC53  REC54  REC55  REC56
REC57  REC58  REC59  REC60

------*-----------------------------------------------------------------------------------------------------------------
---------------------
   .  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
   0.     0.     0.     0.
 10.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 20.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 30.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 40.  *    0.2    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 50.  *    0.3    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 60.  *    0.2    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 70.  *    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.    0.1
```

```
 80.  *    0.1    0.1    0.1    0.1    0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1
 0.2    0.3    0.3    0.4
 90.  *    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.2    0.2    0.3
 0.4    0.5    0.6    0.7
100.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.2    0.2    0.2    0.2    0.3    0.4
0.5    0.5    0.8    0.9
110.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.2    0.3    0.4
0.4    0.5    0.7    0.8
120.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.3    0.4    0.4
0.5    0.5    0.8    0.8
130.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.2    0.3    0.4    0.4
0.4    0.4    0.7    0.7
140.  *     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.2    0.4    0.4    0.4
0.4    0.4    0.7    0.7
150.  *     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.2    0.4    0.4    0.4
0.4    0.5    0.6    0.8
160.  *    0.1    0.1     0.     0.     0.     0.     0.     0.2    0.2    0.3    0.3    0.3    0.3    0.5    0.5    0.5
0.5    0.6    0.7    0.9
170.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.5    0.5    0.5
0.5    0.7    0.9    1.1
180.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.5    0.5    0.5
0.5    0.8    1.2    1.2
190.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.3    0.3    0.5    0.5    0.5    0.6
0.7     1.    1.1    0.9
200.  *    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.3    0.3    0.3    0.3    0.4    0.5    0.5    0.7    0.7
0.8     1.    1.1     1.
210.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.3    0.4    0.6    0.8    0.8    0.8
0.8    1.1    0.9    0.7
220.  *    0.1    0.1    0.1    0.1     0.    0.2    0.2    0.2    0.3    0.3    0.4    0.6    0.7    0.8    0.8    0.8
0.8    0.8    0.9    0.3
230.  *    0.2    0.1    0.1     0.     0.    0.2    0.2    0.2    0.2    0.3    0.3    0.4    0.5    0.5    0.5    0.6
0.5    0.8    0.6    0.3
240.  *     0.     0.     0.    0.1    0.1    0.2    0.3    0.3    0.3    0.3    0.5    0.6    0.5    0.5    0.5    0.5
0.7    0.6    0.6    0.6
250.  *    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.4    0.5    0.5    0.5    0.6    0.6    0.4
0.6    0.5    0.5    0.5
260.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2
0.2    0.2    0.3    0.2
270.  *    0.5    0.4    0.4    0.4    0.4     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.1    0.1    0.3
0.4    0.4    0.4    0.3
```

```
 280.  *    0.5    0.4    0.4    0.4    0.4    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.3
 0.3    0.3    0.3    0.3
 290.  *    0.6    0.6    0.6    0.5    0.5    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.3
 0.3    0.3    0.4    0.4
 300.  *    0.5    0.4    0.4    0.4    0.4    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.3
 0.3    0.3    0.4    0.4
 310.  *    0.4    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2
 0.3    0.3    0.3    0.5
 320.  *    0.3    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2
 0.2    0.2    0.3    0.4
 330.  *    0.3    0.3    0.3    0.3    0.3     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.1    0.2    0.3
 340.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.1    0.1    0.1    0.1
 350.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 360.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.6    0.6    0.6    0.5    0.5    0.3    0.3    0.3    0.3    0.4    0.5    0.6    0.7    0.8    0.8    0.8
 0.8    1.1    1.2    1.2
 DEGR. *    290    290    290    290    290    250    170    170    170    250    240    220    220    210    210    210
 200    210    180    180
```

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	REC61	REC62	REC63	REC64	REC65	REC66	REC67	REC68	REC69	REC70	REC71	REC72	REC73	REC74	REC75	REC76

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 REC77  REC78  REC79  REC80

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *     0.    0.8    0.6    0.6    0.5    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1
   0.1    0.3    0.3    0.3
  10.  *     0.    0.8    0.6    0.6    0.4    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1
  0.3    0.3    0.3    0.4
  20.  *     0.    0.6    0.6    0.4    0.4    0.4    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2
  0.4    0.4    0.4    0.4
  30.  *     0.    0.6    0.6    0.4    0.4    0.4    0.4    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2
  0.4    0.4    0.4    0.4
  40.  *     0.    0.6    0.5    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.2
  0.4    0.4    0.4    0.4
  50.  *     0.    0.5    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.2
  0.3    0.4    0.4    0.4
  60.  *     0.    0.5    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.1
  0.2    0.2    0.2    0.3
  70.  *    0.1    0.4    0.3    0.3    0.4    0.4    0.3    0.3    0.3    0.2    0.2    0.1    0.1    0.1    0.1    0.1
  0.3    0.3    0.4    0.4
  80.  *    0.6    0.4    0.4    0.2    0.2    0.1    0.1    0.2    0.2    0.3    0.3    0.3    0.3    0.2    0.2    0.2
  0.3    0.4    0.4    0.4
  90.  *    0.8    0.4    0.5    0.4    0.4    0.2    0.3    0.3    0.4    0.6    0.4    0.4    0.4    0.4    0.4    0.3
  0.1    0.2    0.2    0.3
 100.  *    0.9    0.4    0.3    0.4    0.5    0.4    0.6    0.6    0.7    0.6    0.5    0.4    0.4    0.4    0.3    0.3
 0.1    0.1    0.1    0.1
 110.  *    0.8    0.2    0.4    0.5    0.6    0.6    0.7    0.8    0.9    0.8    0.5    0.4    0.3    0.2    0.2    0.2
 0.     0.    0.1    0.1
 120.  *    0.8    0.3    0.7    0.9     1.     1.    0.9    0.9    0.9    0.6    0.5    0.3    0.3    0.3    0.3    0.3
 0.1    0.1    0.1    0.1
 130.  *    0.6    0.8    0.8     1.     1.    0.9    0.9    0.9    0.6    0.4    0.3    0.3    0.3    0.3    0.3    0.3
 0.1    0.1    0.1    0.1
 140.  *    0.5    0.9     1.    0.9    0.8    0.8    0.7    0.8    0.5    0.3    0.3    0.3    0.3    0.3    0.3    0.3
 0.1    0.1    0.1    0.1
 150.  *    0.4    0.9    0.9    0.8    0.7    0.7    0.7    0.7    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.3
 0.1    0.1    0.1    0.1
 160.  *    0.6    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.4    0.3    0.3    0.2    0.2    0.2    0.2    0.1
 0.     0.     0.     0.
 170.  *    0.6    0.7    0.6    0.6    0.6    0.6    0.6    0.5    0.2    0.2    0.2    0.2    0.2    0.2    0.2     0.
 0.     0.     0.     0.
```

```
180.  *    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.
0.     0.     0.     0.
190.  *    0.5    0.6    0.6    0.6    0.6    0.6    0.6    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.
0.     0.     0.     0.
200.  *    0.3    0.6    0.6    0.6    0.6    0.6    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.
0.     0.     0.     0.
210.  *    0.2    0.6    0.6    0.6    0.6    0.6    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.
0.     0.     0.     0.
220.  *    0.2    0.6    0.6    0.6    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.
0.     0.     0.     0.
230.  *    0.2    0.6    0.6    0.6    0.4    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.     0.
0.     0.     0.     0.
240.  *    0.4    0.6    0.5    0.4    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.     0.
0.     0.     0.     0.
250.  *    0.5    0.5    0.4    0.3    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.
0.     0.     0.    0.1
260.  *    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.     0.
0.     0.    0.1    0.1
270.  *    0.4    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.
0.     0.    0.1    0.1
280.  *    0.4     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.    0.1    0.2
290.  *    0.5     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.1    0.2    0.2
300.  *    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.1    0.2    0.2
310.  *    0.7     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.1    0.2    0.2
320.  *    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.2    0.2    0.2
330.  *    0.4    0.3    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.2    0.2    0.2
340.  *    0.1    0.7    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.
0.    0.3    0.3    0.3
350.  *     0.    0.7    0.6    0.3    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
0.1    0.3    0.3    0.3
360.  *     0.    0.8    0.6    0.6    0.5    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1
0.1    0.3    0.3    0.3

------*----------------------------------------------------------------------------------------------------------------
```

```
 ---------------------
MAX   *    0.9    0.9     1.     1.     1.     1.    0.9    0.9    0.9    0.8    0.5    0.4    0.4    0.4    0.4    0.3
0.4    0.4    0.4    0.4
DEGR. *    100    140    140    130    120    120    120    120    110    110    100     90     90     90     90     90
20     20     20     10
FF                                                                                                              PAGE    9

      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC81  REC82  REC83  REC84  REC85  REC86  REC87  REC88  REC89  REC90  REC91  REC92  REC93  REC94  REC95  REC96
REC97  REC98  REC99  REC100

------*-------------------------------------------------------------------------------------------------------------
---------------------
   .  *    0.3    0.3    0.4    0.4    0.9     1.     1.    1.1    1.3    1.3    1.2     1.    0.7    0.7    0.8    0.6
  0.6    0.5    0.8    0.7
 10.  *    0.4    0.4    0.4    0.4     1.    1.1    1.2    1.2    1.2    1.3    1.1    0.6    0.5    0.4    0.5    0.4
 0.5    0.7    0.7    0.7
 20.  *    0.4    0.4    0.4    0.5    1.1    1.1    1.2    1.2    1.2     1.     1.    0.5    0.3    0.4    0.4    0.4
 0.7    0.7    0.8    0.9
 30.  *    0.4    0.4    0.5    0.7    1.2    1.2    1.4    1.3    1.2    0.9    0.9    0.3    0.3    0.4    0.3    0.6
 0.8    0.8    0.9    0.9
 40.  *    0.4    0.4    0.5    0.8    1.2    1.3    1.3    1.3    1.2     1.    0.8    0.3    0.3    0.5    0.4    0.8
 0.7    0.7    0.7    0.7
 50.  *    0.4    0.5    0.6    1.1    1.3    1.4    1.4    1.1    0.9    0.7    0.7    0.3    0.4    0.6    0.6    0.8
 0.7    0.6    0.6    0.6
 60.  *    0.4    0.4    0.5    0.9    1.1    1.1    1.2     1.    0.9    0.8    0.8    0.5    0.5    0.5    0.8    0.6
 0.6    0.6    0.6    0.5
 70.  *    0.4    0.5    0.8    0.9    1.1    1.1    1.1     1.     1.     1.    0.7    0.5    0.5    0.5    0.6    0.7
 0.7    0.7    0.7    0.6
```

```
 80.  *    0.4    0.6    0.6    0.7    0.7    0.7    0.8    0.8    0.8    0.7    0.7    0.5    0.5    0.6    0.6    0.6
 0.6    0.6    0.6    0.5
 90.  *    0.3    0.3    0.3    0.5    0.5    0.5    0.6    0.4    0.2    0.4    0.4    0.3    0.4    0.5    0.6    0.6
 0.6    0.6    0.6    0.5
100.  *    0.1    0.1    0.2    0.3    0.4    0.5    0.5    0.4    0.3    0.3    0.5    0.6    0.7    0.7    0.7    0.8
0.8    0.8    0.7    0.6
110.  *    0.1    0.2    0.2    0.2    0.2    0.4    0.5    0.4    0.4    0.4    0.5    0.5    0.6    0.8    0.8    0.8
0.8    0.7    0.7    0.6
120.  *    0.1    0.1    0.1    0.2    0.2    0.2    0.3    0.4    0.4    0.4    0.4    0.6    0.7    0.8    0.8    0.8
0.7    0.8    0.6    0.6
130.  *    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.3    0.3    0.4    0.5    0.7    0.9     1.    0.9    0.8
0.8    0.7    0.7    0.7
140.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.3    0.6    0.6    0.7    0.8    0.8    0.8
0.7    0.7    0.7    0.7
150.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.5    0.7    0.8    0.8    0.7
0.7    0.8    0.8    0.6
160.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.4    0.5    0.5    0.5
0.5    0.5    0.5    0.5
170.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.3    0.3
0.3    0.3    0.2    0.2
180.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1
0.1    0.1    0.1    0.1
190.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
200.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
210.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
240.  *     0.     0.     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
250.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.2    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
260.  *    0.1    0.1    0.1    0.1    0.1    0.3    0.6    0.4    0.4    0.4    0.4    0.3     0.     0.     0.     0.
0.     0.     0.     0.
270.  *    0.2    0.2    0.2    0.2    0.2    0.4    0.8    0.8    0.7    0.7    0.7    0.4    0.4    0.1     0.     0.
0.     0.     0.     0.
```

```
 280.  *    0.2    0.2    0.2    0.2    0.2    0.6    0.9    0.9    0.9    0.9    0.9    0.7    0.7    0.2    0.1     0.
 0.     0.     0.     0.
 290.  *    0.2    0.2    0.2    0.2    0.3    0.7     1.     1.    0.9    0.9    0.9    0.7    0.7    0.4    0.2    0.2
 0.     0.     0.     0.
 300.  *    0.2    0.2    0.2    0.2    0.3    0.9     1.     1.    0.9    0.9    0.9    0.7    0.8    0.4    0.2    0.2
 0.2    0.1     0.     0.
 310.  *    0.2    0.2    0.2    0.2    0.4    0.9     1.    0.9    0.9    0.9    0.9    0.7    0.7    0.3    0.2    0.2
 0.2    0.2    0.2    0.2
 320.  *    0.2    0.2    0.2    0.2    0.4    0.8    0.9    0.9    0.9    0.8    0.9    0.6    0.6    0.4    0.3    0.4
 0.4    0.4    0.2    0.2
 330.  *    0.2    0.2    0.2    0.2    0.5    0.8    0.9    0.9    0.9    0.8    0.9     1.    0.7    0.9    0.9    0.5
 0.5    0.6    0.5    0.4
 340.  *    0.3    0.3    0.3    0.3    0.7    0.9    0.9    0.9    1.1     1.    1.1    1.4    1.1    0.9     1.     1.
 0.9    0.8    0.7    0.7
 350.  *    0.3    0.3    0.3    0.3    0.7     1.     1.    1.1    1.1    1.2    1.4    1.3    0.9    0.9     1.    0.7
 0.8    0.8    0.8    0.9
 360.  *    0.3    0.3    0.4    0.4    0.9     1.     1.    1.1    1.3    1.3    1.2     1.    0.7    0.7    0.8    0.6
 0.6    0.5    0.8    0.7

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.4    0.6    0.8    1.1    1.3    1.4    1.4    1.3    1.3    1.3    1.4    1.4    1.1     1.     1.     1.
 0.9    0.8    0.9    0.9
 DEGR. *     10     80     70     50     50     50     30     30      0      0    350    340    340    130    340    340
 340     30     30     20
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC101 REC102 REC103 REC104 REC105 REC106 REC107 REC108 REC109 REC110 REC111 REC112 REC113 REC114 REC115 REC116
```

REC117

.	*	0.8	0.8	0.8	0.9	0.9	0.	0.	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2
10.	*	0.9	1.	0.9	0.9	0.8	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3
20.	*	1.	0.8	0.8	0.7	0.7	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.2	0.3	0.3
30.	*	0.8	0.7	0.7	0.7	0.7	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.2	0.2	0.3
40.	*	0.7	0.6	0.6	0.6	0.7	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.2
50.	*	0.5	0.4	0.4	0.5	0.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.2
60.	*	0.4	0.5	0.5	0.5	0.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2
70.	*	0.6	0.6	0.6	0.5	0.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
80.	*	0.4	0.5	0.5	0.5	0.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90.	*	0.5	0.5	0.5	0.5	0.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100.	*	0.6	0.6	0.6	0.5	0.4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
110.	*	0.6	0.6	0.6	0.5	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
120.	*	0.6	0.6	0.6	0.5	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
130.	*	0.6	0.6	0.6	0.4	0.3	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1
140.	*	0.6	0.6	0.5	0.4	0.3	0.	0.	0.	0.	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2
150.	*	0.6	0.6	0.5	0.5	0.4	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.6	0.6
160.	*	0.4	0.4	0.4	0.3	0.3	0.3	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	1.	1.1	1.
170.	*	0.2	0.2	0.2	0.2	0.1	0.4	0.5	0.6	0.6	0.7	0.9	0.9	0.9	1.2	1.3	1.4	1.5
180.	*	0.1	0.1	0.1	0.	0.	0.4	0.5	0.6	0.7	0.8	0.8	0.8	1.1	1.3	1.3	1.5	1.4
190.	*	0.	0.	0.	0.	0.	0.3	0.4	0.6	0.7	0.7	0.9	0.9	1.	1.2	1.3	1.3	1.3
200.	*	0.	0.	0.	0.	0.	0.3	0.5	0.6	0.6	0.8	0.8	0.8	1.	1.2	1.2	1.2	1.
210.	*	0.	0.	0.	0.	0.	0.3	0.6	0.6	0.7	0.7	0.7	0.8	0.9	1.	1.	1.	1.
220.	*	0.	0.	0.	0.	0.	0.3	0.5	0.6	0.7	0.7	0.7	0.8	0.9	1.	1.	1.	0.8
230.	*	0.	0.	0.	0.	0.	0.3	0.5	0.6	0.6	0.7	0.7	0.9	1.	1.	1.	1.	0.7
240.	*	0.	0.	0.	0.	0.	0.4	0.6	0.6	0.6	0.7	0.7	0.9	1.	1.	1.	1.	0.7
250.	*	0.	0.	0.	0.	0.	0.5	0.6	0.6	0.6	0.7	0.7	0.9	0.9	1.	1.	1.	0.3
260.	*	0.	0.	0.	0.	0.	0.5	0.6	0.6	0.6	0.7	0.8	0.9	1.	1.	1.	1.	0.2
270.	*	0.	0.	0.	0.	0.	0.6	0.6	0.6	0.6	0.7	0.9	0.9	1.	1.	1.	0.9	0.5
280.	*	0.	0.	0.	0.	0.	0.6	0.6	0.6	0.7	0.7	0.9	1.	1.	1.	1.2	1.	0.6
290.	*	0.	0.	0.	0.	0.	0.7	0.7	0.7	0.7	0.8	0.9	1.	1.1	1.2	1.1	1.2	0.6
300.	*	0.	0.	0.	0.	0.	0.7	0.8	0.8	0.9	1.	1.2	1.2	1.2	1.3	1.1	0.9	0.4
310.	*	0.1	0.1	0.1	0.1	0.1	0.8	0.9	0.9	0.9	1.	1.2	1.2	1.1	1.1	1.2	0.8	0.6
320.	*	0.2	0.1	0.1	0.1	0.1	1.	1.	1.1	1.2	1.1	1.2	1.1	1.3	1.4	1.1	1.1	1.
330.	*	0.4	0.4	0.4	0.4	0.5	1.	1.	1.	1.3	1.3	1.4	1.3	1.1	1.	1.	0.9	0.9
340.	*	0.7	0.8	0.9	0.7	0.9	0.8	0.8	0.7	0.7	0.8	0.8	0.8	0.8	0.7	0.8	0.6	0.6
350.	*	1.	0.9	0.9	0.9	0.9	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.1
360.	*	0.8	0.8	0.8	0.9	0.9	0.	0.	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2

MAX	*	1.	1.	0.9	0.9	0.9	1.	1.	1.1	1.3	1.3	1.4	1.3	1.3	1.4	1.3	1.5	1.5
DEGR.	*	20	10	10	0	0	320	320	320	330	330	330	330	320	320	170	180	170

THE HIGHEST CONCENTRATION OF 1.50 ppm OCCURRED AT RECEPTOR REC117.

FF

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*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/11/2012 11:34:05 AM
** File: F:\2975 FirstLight\Microscale\Worst\12 Hart & County LOS\2022NBPM.ou2
**
*********************************************


                    CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                    PAGE  1

     JOB: First Light - Taunton - Hart & County Sts- 2022 No Build PM             RUN: CAL3QHC
     RUN

     DATE : 12/11/12
     TIME : 11:34: 3

        The MODE flag has been set to C for calculating CO averages.

      SITE & METEOROLOGICAL VARIABLES
      -------------------------------
      VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 100. CM
       U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  0.0 PPM

      LINK VARIABLES
      --------------
                 LINK DESCRIPTION               *              LINK COORDINATES (M)              *    LENGTH  BRG TYPE
                 VPH    EF      H     W    V/C QUEUE
                                               *       X1          Y1            X2          Y2    *     (M)
                                              (DEG)            (G/MI)   (M)   (M)       (VEH)

     ------------------------------------------*-------------------------------------------------*------------------------
     ---------------------------------
      1. Hart EB TL                            *  235870.27    848335.69   235946.16    848348.19 *      77.    81. AG
      228.   8.5   0.0    9.4
      2. Hart EB TL QUEUE                      *  235946.16    848348.19   235908.28    848341.94 *      38.   261. AG
      94. 100.0   0.0    3.4 0.66   6.4
      3. Hart EB RL                            *  235910.48    848343.12   235945.62    848345.50 *      35.    86. AG
```

323. 8.5 0.0 9.0

4. Hart EB RL QUEUE * 235945.62 848345.50 235904.27 848342.69 * 41. 266. AG
72. 100.0 0.0 3.0 0.47 6.9

5. Hart WB LT * 236039.62 848367.12 235970.39 848354.56 * 70. 260. AG
271. 8.5 0.0 9.4

6. Hart WB LT QUEUE * 235970.39 848354.56 236015.28 848362.69 * 46. 80. AG
94. 100.0 0.0 3.4 0.79 7.6

7. Hart WB RL * 236019.66 848365.25 235969.06 848357.75 * 51. 262. AG
220. 8.5 0.0 9.0

8. Hart WB RL QUEUE * 235969.06 848357.75 235999.53 848362.25 * 31. 82. AG
78. 100.0 0.0 3.0 0.37 5.1

9. 140 NB L * 235982.64 848282.94 235962.94 848336.75 * 57. 340. AG
253. 8.5 0.0 9.4

10. 140 NB L QUEUE * 235962.94 848336.75 236054.06 848087.88 * 265. 160. AG
104. 100.0 0.0 3.4 1.35 44.2

11. 140 NB TRL * 235983.98 848285.06 235965.06 848337.00 * 55. 340. AG
733. 8.5 0.0 9.0

12. 140 NB TRL QUEUE * 235965.06 848337.00 236281.11 847469.50 * 923. 160. AG
86. 100.0 0.0 3.0 1.55 153.9

13. 140 SB LL * 235919.00 848421.94 235949.36 848359.12 * 70. 154. AG
131. 8.5 0.0 9.4

14. 140 SB LL QUEUE * 235949.36 848359.12 235872.38 848518.38 * 177. 334. AG
111. 100.0 0.0 3.4 1.52 29.5

15. 140 SB TR * 235919.53 848419.00 235945.62 848359.38 * 65. 156. AG
914. 8.5 0.0 9.4

16. 140 SB TR QUEUE * 235945.62 848359.38 235197.27 850069.38 * 1867. 336. AG
93. 100.0 0.0 3.4 2.55 311.1

17. Hart EB OUTBOUND * 235965.73 848350.19 236039.41 848363.12 * 75. 80. AG
413. 8.5 0.0 9.4

18. Hart WB OUTBOUND * 235941.72 848352.06 235869.94 848338.81 * 73. 260. AG
424. 8.5 0.0 9.4

19. 140 NB OUTBOUND * 235952.52 848359.88 235923.64 848423.31 * 70. 336. AG
899. 8.5 0.0 9.4

20. 140 SB OUTBOUND * 235956.02 848338.31 235978.42 848283.25 * 59. 158. AG
1337. 8.5 0.0 9.4

21. EBL * 235946.53 848348.12 235953.55 848359.31 * 13. 32. AG
71. 9.4 0.0 9.0

22. EBT * 235946.27 848348.31 235965.38 848350.44 * 19. 84. AG
157. 8.5 0.0 9.0

23. EBR * 235944.44 848346.44 235956.19 848338.50 * 14. 124. AG

323. 10.3 0.0 9.0
24. WBL * 235969.30 848354.88 235956.00 848339.56 * 20. 221. AG
121. 9.4 0.0 9.0
25. WBT * 235969.11 848354.62 235942.53 848351.69 * 27. 264. AG
150. 8.5 0.0 9.0
26. WBR * 235967.92 848357.19 235952.72 848359.31 * 15. 278. AG
220. 10.3 0.0 9.0
27. NBL * 235962.92 848337.50 235942.34 848352.00 * 25. 305. AG
253. 9.4 0.0 9.0
28. NBT * 235964.83 848337.69 235952.81 848359.44 * 25. 331. AG
608. 8.5 0.0 9.0
29. NBR * 235964.45 848338.56 235967.66 848350.31 * 12. 15. AG
125. 10.3 0.0 9.0
30. SBL * 235949.27 848359.25 235965.19 848350.25 * 18. 119. AG
131. 9.4 0.0 9.0
31. SBT * 235945.70 848359.44 235956.09 848338.94 * 23. 153. AG
893. 8.5 0.0 9.0
32. SBR * 235946.34 848359.62 235939.53 848350.81 * 11. 218. AG
21. 10.3 0.0 9.0

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JOB: First Light - Taunton - Hart & County Sts- 2022 No Build PM RUN: CAL3QHC
RUN

DATE : 12/11/12
TIME : 11:34: 3

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION / ARRIVAL	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	RATE
2. Hart EB TL QUEUE	*	132	101	5.0	228	1900	45.89	2	3
4. Hart EB RL QUEUE	*	132	77	5.0	323	1900	45.89	2	3
6. Hart WB LT QUEUE	*	132	101	5.0	271	1900	45.89	2	3
8. Hart WB RL QUEUE	*	132	84	5.0	220	1900	45.89	2	3
10. 140 NB L QUEUE	*	132	112	5.0	253	1900	45.89	2	3

12. 140 NB TRL QUEUE	*	132	92	5.0	733	1900	45.89	2	3
14. 140 SB LL QUEUE	*	132	119	5.0	131	1900	45.89	2	3
16. 140 SB TR QUEUE	*	132	100	5.0	914	1900	45.89	2	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235961.95	848360.62	1.8	*
2. LR_2	*	235956.00	848363.88	1.8	*
3. LR_3	*	235953.88	848368.38	1.8	*
4. LR_4	*	235951.77	848372.94	1.8	*
5. LR_5	*	235949.66	848377.50	1.8	*
6. LR_6	*	235947.55	848382.00	1.8	*
7. LR_7	*	235945.42	848386.50	1.8	*
8. LR_8	*	235943.31	848391.06	1.8	*
9. LR_9	*	235941.19	848395.56	1.8	*
10. LR_10	*	235939.06	848400.12	1.8	*
11. LR_11	*	235936.95	848404.62	1.8	*
12. LR_12	*	235934.84	848409.19	1.8	*
13. LR_13	*	235932.73	848413.69	1.8	*
14. LR_14	*	235930.61	848418.25	1.8	*
15. LR_15	*	235928.50	848422.75	1.8	*
16. LR_16	*	235913.59	848419.25	1.8	*
17. LR_17	*	235915.72	848414.69	1.8	*
18. LR_18	*	235917.83	848410.19	1.8	*
19. LR_19	*	235919.95	848405.62	1.8	*
20. LR_20	*	235922.06	848401.12	1.8	*
21. LR_21	*	235924.19	848396.56	1.8	*
22. LR_22	*	235926.30	848392.06	1.8	*
23. LR_23	*	235928.41	848387.50	1.8	*
24. LR_24	*	235930.52	848383.00	1.8	*
25. LR_25	*	235932.64	848378.50	1.8	*
26. LR_26	*	235934.75	848373.94	1.8	*
27. LR_27	*	235936.88	848369.44	1.8	*
28. LR_28	*	235938.98	848364.88	1.8	*
29. LR_29	*	235941.09	848360.31	1.8	*
30. LR_31	*	235969.44	848342.38	1.8	*
31. LR_32	*	235970.98	848345.12	1.8	*

32. LR_33	*	235975.58	848347.31	1.8 *
33. LR_34	*	235980.50	848348.19	1.8 *
34. LR_35	*	235985.42	848349.12	1.8 *
35. LR_36	*	235990.34	848350.00	1.8 *
36. LR_37	*	235995.27	848350.94	1.8 *

JOB: First Light - Taunton - Hart & County Sts- 2022 No Build PM RUN: CAL3QHC
RUN

RECEPTOR	*	X	Y	Z *
	*	COORDINATES (M)		*
37. LR_38	*	236000.19	848351.81	1.8 *
38. LR_39	*	236005.09	848352.69	1.8 *
39. LR_40	*	236010.02	848353.62	1.8 *
40. LR_41	*	236014.94	848354.50	1.8 *
41. LR_42	*	236019.84	848355.38	1.8 *
42. LR_43	*	236024.77	848356.31	1.8 *
43. LR_44	*	236029.69	848357.19	1.8 *
44. LR_45	*	236034.61	848358.12	1.8 *
45. LR_46	*	236039.53	848359.00	1.8 *
46. LR_47	*	236041.47	848373.19	1.8 *
47. LR_48	*	236036.55	848372.31	1.8 *
48. LR_49	*	236031.62	848371.44	1.8 *
49. LR_50	*	236026.70	848370.50	1.8 *
50. LR_51	*	236021.80	848369.62	1.8 *
51. LR_52	*	236016.88	848368.69	1.8 *
52. LR_53	*	236011.95	848367.81	1.8 *
53. LR_54	*	236007.05	848366.94	1.8 *
54. LR_55	*	236002.12	848366.00	1.8 *
55. LR_56	*	235997.20	848365.12	1.8 *
56. LR_57	*	235992.28	848364.25	1.8 *
57. LR_58	*	235987.38	848363.31	1.8 *
58. LR_59	*	235982.45	848362.44	1.8 *
59. LR_60	*	235977.53	848361.50	1.8 *
60. LR_61	*	235972.61	848360.62	1.8 *
61. LR_62	*	235967.69	848359.75	1.8 *
62. LR_64	*	235938.45	848355.44	1.8 *
63. LR_65	*	235933.53	848354.56	1.8 *
64. LR_66	*	235928.59	848353.69	1.8 *

65.	LR_67	*	235923.69	848352.88	1.8 *
66.	LR_68	*	235918.75	848352.00	1.8 *
67.	LR_69	*	235913.83	848351.12	1.8 *
68.	LR_70	*	235908.91	848350.25	1.8 *
69.	LR_71	*	235903.97	848349.44	1.8 *
70.	LR_72	*	235899.05	848348.56	1.8 *
71.	LR_73	*	235894.12	848347.69	1.8 *
72.	LR_74	*	235889.20	848346.88	1.8 *
73.	LR_75	*	235884.27	848346.00	1.8 *
74.	LR_76	*	235879.34	848345.12	1.8 *
75.	LR_77	*	235874.42	848344.25	1.8 *
76.	LR_78	*	235869.48	848343.44	1.8 *
77.	LR_79	*	235871.02	848332.75	1.8 *
78.	LR_80	*	235875.95	848333.56	1.8 *
79.	LR_81	*	235880.88	848334.44	1.8 *
80.	LR_82	*	235885.80	848335.31	1.8 *
81.	LR_83	*	235890.73	848336.12	1.8 *
82.	LR_84	*	235895.66	848337.00	1.8 *
83.	LR_85	*	235900.58	848337.88	1.8 *
84.	LR_86	*	235905.50	848338.75	1.8 *
85.	LR_87	*	235910.44	848339.56	1.8 *
86.	LR_88	*	235915.36	848340.44	1.8 *
87.	LR_89	*	235920.28	848341.31	1.8 *
88.	LR_90	*	235925.38	848341.50	1.8 *
89.	LR_91	*	235930.12	848341.56	1.8 *
90.	LR_92	*	235935.22	848341.44	1.8 *
91.	LR_93	*	235940.47	848342.31	1.8 *
92.	LR_94	*	235945.70	848340.75	1.8 *
93.	LR_96	*	235948.52	848339.25	1.8 *

FF

JOB: First Light - Taunton - Hart & County Sts- 2022 No Build PM RUN: CAL3QHC
RUN

RECEPTOR		X	Y	Z	
	*	COORDINATES (M)			*
94.	LR_97 *	235952.20	848335.62	1.8	*
95.	LR_98 *	235954.11	848331.00	1.8	*
96.	LR_99 *	235956.02	848326.38	1.8	*
97.	LR_100 *	235957.94	848321.75	1.8	*

98.	LR_101	*	235959.84	848317.12	1.8 *
99.	LR_102	*	235961.77	848312.50	1.8 *
**.	LR_103	*	235963.67	848307.88	1.8 *
**.	LR_104	*	235965.58	848303.25	1.8 *
**.	LR_105	*	235967.50	848298.69	1.8 *
**.	LR_106	*	235969.41	848294.06	1.8 *
**.	LR_107	*	235971.31	848289.44	1.8 *
**.	LR_108	*	235973.23	848284.81	1.8 *
**.	LR_109	*	235988.36	848288.12	1.8 *
**.	LR_110	*	235986.45	848292.75	1.8 *
**.	LR_111	*	235984.55	848297.38	1.8 *
**.	LR_112	*	235982.62	848302.00	1.8 *
**.	LR_113	*	235980.70	848306.62	1.8 *
**.	LR_114	*	235978.80	848311.25	1.8 *
**.	LR_115	*	235976.89	848315.88	1.8 *
**.	LR_116	*	235974.98	848320.50	1.8 *
**.	LR_117	*	235973.06	848325.12	1.8 *
**.	LR_118	*	235971.16	848329.75	1.8 *
**.	LR_119	*	235969.23	848334.38	1.8 *
**.	LR_120	*	235967.33	848339.00	1.8 *

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	*	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.7	0.7	1.	1.2	1.1

```
 10.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.7    0.9     1.    1.1
 20.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.7    0.9    1.1    1.1
 30.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.7    0.9    1.1    1.1
 40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.5
 0.7     1.     1.    1.1
 50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.5
 0.8     1.    0.9     1.
 60.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.9     1.     1.     1.
 70.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 1.     1.     1.     1.
 80.  *    0.4    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.7
 0.9     1.     1.    1.1
 90.  *    0.8    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.8
 1.     1.     1.    1.1
100.  *    0.8    0.6    0.3    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.9
1.1    1.1    1.1    1.1
110.  *    0.7    0.4    0.3    0.3    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     1.
1.1    1.1    1.1    1.1
120.  *    0.4    0.4    0.3    0.3    0.2    0.2    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     1.1
1.1    1.1    1.2    1.2

------*-----------------------------------------------------------------------------------------------------------------
----------------------
MAX   *    0.8    0.6    0.3    0.3    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     1.1
1.1    1.1    1.2    1.2
DEGR. *     90    100    100    110    110    120      0      0      0      0      0      0      0      0      0    120
100    100      0    120
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
130.	*	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	1.3	1.3	1.3	1.3	1.2
140.	*	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	1.3	1.3	1.3	1.4	1.4
150.	*	0.5	0.6	0.7	0.6	0.7	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	1.3	1.3	1.3	1.3	1.3
160.	*	0.8	1.	1.	1.	1.	1.1	1.1	0.9	0.9	1.	1.	1.	1.1	1.1	1.2	0.9	1.	1.	0.8	0.8
170.	*	0.9	1.1	1.	0.9	0.9	1.	1.1	1.2	1.2	1.2	1.2	1.3	1.4	1.3	1.3	0.2	0.2	0.2	0.2	0.1
180.	*	0.7	0.9	0.6	0.8	0.7	0.9	1.	1.	1.	1.	1.1	1.1	1.1	1.1	1.2	0.	0.	0.	0.1	0.1
190.	*	0.6	0.7	0.6	0.6	0.9	1.	0.9	1.1	1.1	1.2	1.1	1.1	1.1	1.1	1.1	0.	0.	0.	0.	0.
200.	*	0.5	0.5	0.7	0.9	1.1	1.1	1.	1.	1.	0.9	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
210.	*	0.3	0.5	0.6	1.	1.	1.1	1.	1.	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
220.	*	0.3	0.6	1.	1.1	1.2	1.1	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
230.	*	0.5	0.7	1.1	1.	0.9	0.7	0.7	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
240.	*	0.6	0.9	1.1	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.	0.	0.	0.	0.
250.	*	0.6	1.1	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.	0.	0.	0.	0.
260.	*	0.8	0.8	0.8	0.7	0.7	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.	0.	0.	0.	0.
270.	*	0.6	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.6	0.	0.	0.	0.	0.

```
 280.  *    0.7    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.5     0.
 0.     0.     0.     0.
 290.  *    0.8     1.     1.    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.7    0.5     0.
 0.     0.     0.     0.
 300.  *    0.8    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.9    0.9    0.7    0.6     0.
 0.     0.     0.     0.
 310.  *    0.9    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.9    0.9    0.7    0.6     0.
 0.     0.     0.     0.
 320.  *    0.8    1.1    1.1    1.1    1.1    1.1    1.2    1.1    1.1    1.1    1.1    0.9    0.9    0.8    0.7    0.2
 0.2    0.2    0.2    0.3
 330.  *    0.7    1.1    1.1    1.1    1.1     1.     1.     1.     1.    0.8    0.8    0.8    0.7    0.7    0.6    0.4
 0.4    0.6    0.6    0.6
 340.  *    0.3    0.7    0.7    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.4    0.3    0.7
 0.7    0.8    0.9    0.9
 350.  *     0.    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.8
 0.8    0.9     1.    1.2
 360.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.    0.7
 0.7     1.    1.2    1.1

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.9    1.1    1.1    1.1    1.2    1.1    1.2    1.2    1.2    1.2    1.2    1.3    1.4    1.3    1.3    1.3
 1.3    1.3    1.4    1.4
 DEGR. *    170    170    230    220    220    160    320    170    170    170    170    170    170    170    170    130
 130    130    140    140
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36

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 REC37  REC38  REC39  REC40

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---------------------
   .  *    1.1    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.3    0.3    0.3    0.5    0.5    0.5    0.5    0.5
   0.5    0.4    0.4    0.3
  10.  *    1.1    1.2    1.2    1.2    1.2    1.2    1.3    1.3    1.3    0.3    0.3    0.5    0.5    0.5    0.5    0.5
  0.4    0.4    0.4    0.3
  20.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    0.3    0.5    0.5    0.5    0.5    0.5    0.5
  0.4    0.4    0.3    0.2
  30.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.5    0.5    0.5    0.5    0.5    0.5    0.4
  0.4    0.4    0.3    0.2
  40.  *    1.1    1.1     1.     1.     1.     1.     1.     1.     1.    0.5    0.5    0.6    0.6    0.6    0.6    0.5
  0.5    0.4    0.4    0.3
  50.  *    1.1     1.     1.     1.     1.     1.     1.     1.     1.    0.5    0.6    0.6    0.6    0.6    0.5    0.5
  0.4    0.4    0.3    0.3
  60.  *    0.9     1.     1.     1.     1.     1.     1.     1.     1.    0.4    0.6    0.6    0.6    0.5    0.5    0.4
  0.4    0.3    0.3    0.3
  70.  *    0.9     1.     1.     1.     1.     1.     1.     1.    0.9    0.2    0.4    0.4    0.4    0.4    0.4    0.4
  0.3    0.3    0.2    0.2
  80.  *    1.1     1.     1.     1.     1.     1.     1.     1.     1.    0.1    0.2    0.3    0.3    0.2    0.2    0.2
  0.2    0.1    0.1    0.1
  90.  *    1.1    1.1    1.1     1.     1.     1.    1.1    1.2    1.2     0.    0.1    0.1    0.1    0.1    0.1    0.1
  0.1    0.1    0.1    0.1
 100.  *    1.1    1.1    1.1    1.1    1.2    1.2    1.2    1.3    1.2     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 110.  *    1.1    1.1    1.2    1.2    1.2    1.2    1.1    1.2    0.6     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 120.  *    1.2    1.3    1.3    1.3    1.3    1.1    1.1    0.9    0.6     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 130.  *    1.2    1.2    1.2    1.2    1.2    1.2    1.1     1.     1.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 140.  *    1.4    1.5    1.4    1.4    1.5    1.4    1.3     1.    1.1     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 150.  *    1.3    1.3    1.2    1.3    1.1    1.1    1.3    1.3    1.3    0.3    0.2    0.1     0.     0.     0.     0.
 0.     0.     0.     0.
 160.  *    0.8    0.8    0.8    0.8    0.7    0.8    0.8    0.7    0.9    0.8    0.6    0.3    0.2    0.2    0.2    0.1
 0.1    0.1    0.1     0.
 170.  *    0.2    0.2    0.2    0.2    0.2    0.3    0.5    0.7    0.6    1.1    0.9    0.6    0.4    0.2    0.2    0.2
 0.2    0.2    0.2    0.1
```

```
180.  *    0.2    0.2    0.2    0.3    0.3    0.3    0.4    0.4    0.3    1.2     1.    0.6    0.5    0.4    0.2    0.2
0.2    0.2    0.2    0.2
190.  *     0.    0.1    0.1    0.2    0.2    0.3    0.3    0.3    0.4    1.1    0.9    0.7    0.5    0.4    0.4    0.3
0.2    0.2    0.2    0.2
200.  *     0.     0.     0.    0.1    0.2    0.3    0.3    0.3    0.4     1.    0.8    0.6    0.5    0.4    0.4    0.4
0.4    0.3    0.2    0.2
210.  *     0.     0.     0.     0.    0.2    0.3    0.3    0.3    0.5    0.7    0.6    0.5    0.5    0.4    0.4    0.4
0.4    0.4    0.3    0.3
220.  *     0.     0.     0.     0.    0.1    0.2    0.3    0.3    0.5    0.6    0.6    0.5    0.5    0.4    0.4    0.4
0.4    0.4    0.4    0.4
230.  *     0.     0.     0.     0.     0.    0.1    0.1    0.3    0.5    0.6    0.4    0.4    0.4    0.4    0.4    0.4
0.4    0.4    0.4    0.2
240.  *     0.     0.     0.     0.     0.     0.    0.1    0.1    0.3    0.4    0.2    0.2    0.2    0.2    0.2    0.2
0.2    0.2    0.2    0.2
250.  *     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.4    0.4    0.3    0.4    0.3    0.2    0.2
0.2    0.2    0.2    0.2
260.  *     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.7    0.5    0.5    0.5    0.4    0.4    0.2
0.1    0.3    0.3    0.3
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.8    0.6    0.6    0.6    0.5    0.6    0.5
0.3    0.5    0.5    0.6
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.7    0.5    0.4    0.4    0.5    0.4    0.5
0.6    0.6    0.6    0.6
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.2    0.6    0.8    0.7     1.     1.
1.     1.    1.1    1.1
300.  *     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.6    0.6    0.6    0.6     1.     1.     1.
1.    1.1    1.1     1.
310.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.7    0.7    0.6    0.8    0.9    0.9    0.9
0.8    0.9    0.8    0.7
320.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.8    0.9    0.8    0.9    0.9    0.8    0.7
0.7    0.7    0.6    0.5
330.  *    0.7    0.7    0.7    0.7    0.8    0.8    0.8    0.8    0.9    0.8    0.7    0.7    0.8    0.7    0.7    0.6
0.6    0.6    0.5    0.5
340.  *     1.     1.    1.1    1.2    1.3    1.3    1.3    1.4    1.4    0.4    0.4    0.6    0.6    0.6    0.6    0.6
0.6    0.4    0.4    0.4
350.  *    1.2    1.3    1.3    1.3    1.5    1.6    1.6    1.6    1.6    0.1    0.3    0.5    0.5    0.5    0.5    0.5
0.5    0.4    0.4    0.3
360.  *    1.1    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.3    0.3    0.3    0.5    0.5    0.5    0.5    0.5
0.5    0.4    0.4    0.3

------*-----------------------------------------------------------------------------------------------------------------
```

```
 ---------------------
MAX   *    1.4    1.5    1.4    1.4    1.5    1.6    1.6    1.6    1.6    1.2     1.    0.8    0.9     1.     1.     1.
1.    1.1    1.1    1.1
DEGR. *    140    140    140    140    140    350    350    350    350    180    180    320    320    300    290    290
290    300    290    290
FF                                                                                                                PAGE   7

      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC41  REC42  REC43  REC44  REC45  REC46  REC47  REC48  REC49  REC50  REC51  REC52  REC53  REC54  REC55  REC56
REC57  REC58  REC59  REC60

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---------------------
   .  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
 10.  *    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 20.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 30.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 40.  *    0.3    0.3    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 50.  *    0.3    0.3    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 60.  *    0.3    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.1
 70.  *    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1
 0.1    0.2    0.2    0.3
```

```
 80.  *    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.3
 0.4    0.4    0.6    0.6
 90.  *    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.3    0.4    0.4    0.5
 0.7    0.7    0.8    0.9
100.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.2    0.3    0.3    0.4    0.5    0.6
0.8    0.9     1.     1.
110.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.3    0.4    0.5    0.5    0.8
0.9    0.9     1.     1.
120.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.3    0.4    0.5    0.5    0.8
0.9    0.9    0.9    0.9
130.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.3    0.5    0.5    0.6    0.8
0.8    0.8    0.8    0.8
140.  *     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.4    0.5    0.5    0.6    0.8
0.8    0.8    0.8    0.8
150.  *     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.4    0.5    0.5    0.7    0.7
0.7    0.8    0.8    0.9
160.  *     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.3    0.5    0.5    0.6    0.8    0.8
0.8     1.     1.     1.
170.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.4    0.6    0.7    0.7    0.9    0.9
0.9     1.    1.2    1.4
180.  *    0.2    0.2    0.2    0.2    0.1    0.1    0.3    0.4    0.4    0.4    0.5    0.7    0.7    0.7    0.9    0.9
0.9    1.2    1.3    1.4
190.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.4    0.4    0.4    0.4    0.6    0.7    0.7    0.7     1.    1.1
1.2    1.2    1.2    1.3
200.  *    0.2    0.2    0.2    0.2    0.1    0.2    0.3    0.4    0.4    0.4    0.6    0.7    0.8     1.    1.1    1.2
1.2    1.2    1.3    1.2
210.  *    0.2    0.2    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.6    0.8    0.8    0.9     1.    1.2    1.2
1.2    1.2     1.    0.8
220.  *    0.3    0.2    0.2    0.1    0.1    0.3    0.4    0.4    0.4    0.6    0.7    0.8    0.9    1.1    1.1    1.1
1.1    0.9     1.    0.6
230.  *    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.4    0.4    0.6    0.7    0.7    0.8    0.9     1.     1.
0.9     1.    0.9    0.4
240.  *    0.2    0.2    0.2    0.2    0.2    0.4    0.4    0.4    0.6    0.6    0.8    0.7    0.8    0.9    0.8    0.8
1.    0.9    0.8    0.7
250.  *    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.6    0.6    0.6    0.6    0.6    0.7    0.8    0.8    0.8
0.9    0.9    0.7    0.7
260.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.4
0.5    0.5    0.6    0.6
270.  *    0.6    0.6    0.6    0.5    0.4     0.    0.1    0.1    0.1    0.2    0.3    0.3    0.3    0.4    0.4    0.5
0.5    0.6    0.6    0.5
```

```
 280.  *    0.7    0.7    0.7    0.4    0.4    0.1    0.1    0.1    0.2    0.2    0.3    0.4    0.4    0.4    0.4    0.4
 0.4    0.4    0.4    0.4
 290.  *    1.1    0.9    0.6    0.5    0.5    0.1    0.1    0.2    0.2    0.2    0.3    0.4    0.4    0.4    0.4    0.4
 0.4    0.4    0.4    0.4
 300.  *    0.8    0.7    0.6    0.5    0.5    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.4    0.4
 0.4    0.4    0.4    0.6
 310.  *    0.7    0.5    0.4    0.4    0.3    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.3
 0.4    0.4    0.4    0.5
 320.  *    0.4    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2
 0.2    0.3    0.3    0.5
 330.  *    0.4    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.2    0.2    0.4
 340.  *    0.2    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 350.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 360.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.1    0.9    0.7    0.5    0.5    0.4    0.4    0.6    0.6    0.6    0.8    0.8    0.9    1.1    1.2    1.2
 1.2    1.2    1.3    1.4
 DEGR. *    290    290    280    270    290    240    190    250    240    210    210    210    210    220    210    200
 190    180    180    170
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
*	REC61	REC62	REC63	REC64	REC65	REC66	REC67	REC68	REC69	REC70	REC71	REC72	REC73	REC74	REC75	REC76

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 REC77  REC78  REC79  REC80

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *     0.     1.    0.7    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1
   0.2    0.3    0.3    0.4
  10.  *     0.    0.9    0.7    0.6    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2
  0.4    0.4    0.4    0.4
  20.  *     0.    0.8    0.7    0.5    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2
  0.4    0.4    0.4    0.4
  30.  *     0.    0.8    0.6    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.2
  0.3    0.4    0.4    0.4
  40.  *     0.    0.8    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.1
  0.3    0.3    0.5    0.6
  50.  *     0.    0.7    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.2    0.1
  0.4    0.5    0.5    0.6
  60.  *    0.1    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.1
  0.3    0.3    0.3    0.5
  70.  *    0.3    0.5    0.6    0.6    0.5    0.5    0.5    0.4    0.4    0.3    0.2    0.1    0.1    0.1    0.1    0.1
  0.5    0.5    0.5    0.5
  80.  *    0.7    0.6    0.5    0.3    0.3    0.3    0.2    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.3
  0.4    0.4    0.4    0.4
  90.  *    0.9    0.6    0.6    0.5    0.5    0.5    0.5    0.6    0.6    0.7    0.6    0.5    0.5    0.5    0.5    0.5
  0.1    0.2    0.3    0.3
 100.  *     1.    0.6    0.5    0.4    0.6    0.6    0.8    0.8    0.8    0.9    0.9    0.6    0.6    0.6    0.6    0.5
 0.2    0.2    0.2    0.2
 110.  *     1.    0.5    0.6    0.7    0.9    0.9    0.9     1.     1.     1.    0.7    0.7    0.7    0.5    0.5    0.5
 0.2    0.2    0.2    0.2
 120.  *    0.9    0.7    0.9    1.1    1.1    1.1    1.2    1.1    1.1    0.9    0.8    0.6    0.6    0.5    0.4    0.4
 0.1    0.1    0.1    0.2
 130.  *    0.6    1.1    1.2    1.1     1.     1.     1.     1.     1.    0.7    0.5    0.4    0.4    0.4    0.4    0.4
 0.2    0.2    0.2    0.2
 140.  *    0.6    1.1    1.2    1.1    0.9    0.9    0.9    0.9    0.7    0.5    0.4    0.4    0.4    0.4    0.4    0.3
 0.1    0.1    0.2    0.2
 150.  *    0.5    1.3    0.9    0.9    0.9    0.8    0.8    0.8    0.6    0.4    0.3    0.3    0.3    0.3    0.3    0.2
 0.1    0.1    0.1    0.1
 160.  *    0.9    0.9    0.9    0.8    0.8    0.7    0.7    0.7    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.1
 0.     0.     0.     0.
 170.  *    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1
 0.     0.     0.     0.
```

```
 180.   *    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2     0.
 0.     0.     0.     0.
 190.   *    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.1     0.
 0.     0.     0.     0.
 200.   *    0.5    0.6    0.6    0.6    0.6    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1     0.
 0.     0.     0.     0.
 210.   *    0.4    0.6    0.6    0.6    0.6    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1     0.
 0.     0.     0.     0.
 220.   *    0.3    0.7    0.7    0.7    0.7    0.6    0.5    0.3    0.3    0.3    0.3    0.3    0.3    0.1    0.1     0.
 0.     0.     0.     0.
 230.   *    0.4    0.7    0.7    0.7    0.6    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1     0.
 0.     0.     0.     0.
 240.   *    0.6    0.7    0.7    0.6    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1    0.1     0.
 0.     0.     0.     0.
 250.   *    0.7    0.5    0.5    0.5    0.4    0.3    0.3    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1     0.
 0.     0.     0.    0.1
 260.   *    0.6    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1     0.     0.
 0.     0.    0.1    0.1
 270.   *    0.7    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.
 0.     0.    0.1    0.2
 280.   *    0.5    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 290.   *    0.7     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.2    0.2
 300.   *    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 310.   *    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 320.   *    0.7     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 330.   *    0.4    0.4    0.2    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 340.   *    0.2    0.8    0.4    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.3    0.3    0.3
 350.   *     0.     1.    0.7    0.6    0.4    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.2    0.3    0.3    0.3
 360.   *     0.     1.    0.7    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1
 0.2    0.3    0.3    0.4

------*-----------------------------------------------------------------------------------------------------------------
```

```
 ---------------------
MAX   *     1.    1.3    1.2    1.1    1.1    1.1    1.2    1.1    1.1     1.    0.9    0.7    0.7    0.6    0.6    0.5
0.5    0.5    0.5    0.6
DEGR. *    100    150    130    120    120    120    120    120    120    110    100    110    110    100    100     90
70     50     40     40
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

```
WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC81  REC82  REC83  REC84  REC85  REC86  REC87  REC88  REC89  REC90  REC91  REC92  REC93  REC94  REC95  REC96
REC97  REC98  REC99  REC100

------*-----------------------------------------------------------------------------------------------------------------
---------------------
   .  *    0.4    0.4    0.4    0.6    0.9     1.    1.1    1.2    1.2    1.4    1.4    1.2     1.     1.     1.    0.8
  0.9    0.8     1.    0.9
 10.  *    0.4    0.4    0.4    0.6    1.1    1.2    1.2    1.2    1.2    1.2    1.2    0.9    0.8    0.8    0.8    0.6
 0.7    0.9     1.     1.
 20.  *    0.4    0.4    0.5    0.9    1.2    1.2    1.2    1.2    1.2    1.1    1.1    0.7    0.7    0.6    0.6    0.5
 0.9     1.    1.1    1.2
 30.  *    0.5    0.6    0.7    0.9    1.3    1.3    1.4    1.3    1.2    1.2     1.    0.5    0.5    0.6    0.6    0.7
 0.9     1.     1.     1.
 40.  *    0.6    0.6    0.7     1.    1.3    1.4    1.4    1.4    1.4     1.     1.    0.5    0.5    0.8    0.8     1.
 1.1     1.     1.    0.9
 50.  *    0.6    0.9     1.    1.2    1.4    1.4    1.5    1.3    1.1    0.7    0.9    0.5    0.7    0.9    0.9     1.
 1.1     1.    0.9    0.9
 60.  *    0.5    0.5    0.8    1.1    1.1    1.1    1.2    1.1    0.9    0.9    1.1    0.8    0.8    0.8    0.9    1.1
 0.9    0.9    0.9    0.9
 70.  *    0.4    0.7    0.8     1.    1.3    1.3    1.4     1.     1.    1.2     1.    0.8    0.8    0.7    0.7    0.9
 0.9    0.9    0.9    0.9
```

```
 80.  *    0.4    0.7    0.7    0.9     1.    1.1    1.1    0.9    0.9    0.8    0.8    0.7    0.8    0.6    0.8    0.9
 0.9    0.9    0.9    0.9
 90.  *    0.3    0.4    0.5    0.6    0.6    0.6    0.8    0.6    0.4    0.5    0.5    0.6    0.5    0.7    0.9    0.9
 0.9    0.9    0.9    0.9
100.  *    0.2    0.2    0.3    0.4    0.5    0.6    0.6    0.4    0.3    0.5    0.5    0.8    0.8    0.8    0.9    0.9
0.9    0.9    0.9    0.9
110.  *    0.2    0.2    0.3    0.3    0.4    0.4    0.5    0.5    0.5    0.5    0.7    0.7    0.8    0.9     1.    1.1
1.1    1.1    1.1    1.1
120.  *    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.5    0.5    0.5    0.6    0.7    0.8     1.    1.1    1.2
1.2    1.2    1.2    1.2
130.  *    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.4    0.5    0.5    0.7    0.8     1.    1.3    1.3    1.3
1.3    1.3    1.2    1.2
140.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.6    0.7    0.9    1.1    1.4    1.4    1.3
1.3    1.3    1.3    1.3
150.  *    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.5    0.8    0.9    1.2    1.2    1.2
1.2    1.2    1.2     1.
160.  *     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.2    0.2    0.3    0.4    0.5    0.9    0.9    0.9
0.9    0.8    0.8    0.8
170.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.3    0.5    0.5    0.5
0.4    0.4    0.4    0.4
180.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1
0.1    0.1    0.1    0.1
190.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1
0.1    0.1    0.1    0.1
200.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
210.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
240.  *     0.     0.     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
250.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.2    0.1    0.2     0.     0.     0.     0.     0.
0.     0.     0.     0.
260.  *    0.1    0.2    0.2    0.2    0.2    0.3    0.6    0.5    0.5    0.5    0.5    0.3     0.     0.     0.     0.
0.     0.     0.     0.
270.  *    0.2    0.2    0.2    0.2    0.2    0.6    0.8    0.8    0.7    0.7    0.8    0.6    0.5    0.2     0.     0.
0.     0.     0.     0.
```

```
 280.  *    0.2    0.2    0.2    0.2    0.3    0.9    1.1    0.9    0.9    0.9     1.    0.7    0.7    0.4    0.2     0.
 0.     0.     0.     0.
 290.  *    0.2    0.2    0.2    0.2    0.4    0.8     1.     1.    0.9    0.9     1.    0.7    0.7    0.4    0.3    0.2
 0.     0.     0.     0.
 300.  *    0.2    0.2    0.2    0.2    0.5    0.9     1.     1.    0.9    0.9    0.9    0.7    0.8    0.6    0.4    0.3
 0.2    0.3    0.1    0.1
 310.  *    0.2    0.2    0.2    0.2    0.5     1.     1.    0.9    0.9    0.9    0.9    0.8    0.8    0.5    0.4    0.3
 0.3    0.3    0.3    0.2
 320.  *    0.2    0.2    0.2    0.2    0.6    0.8    0.9    0.9    0.8    0.8    0.8    0.8    0.7    0.6    0.5    0.4
 0.4    0.3    0.2    0.3
 330.  *    0.2    0.2    0.2    0.2    0.6    0.8    0.9    0.9    0.9    0.8    0.9    1.2     1.    1.2    0.9     1.
 0.9    0.8    0.8    0.6
 340.  *    0.3    0.3    0.3    0.4    0.8    0.9     1.     1.    1.1    1.1    1.3    1.5    1.3    1.3    1.2    1.1
 1.    1.1     1.    1.1
 350.  *    0.3    0.3    0.3    0.5    0.9     1.     1.    1.2    1.2    1.3    1.4    1.5    1.3    1.2    1.2    1.2
 1.    1.1    1.2    1.3
 360.  *    0.4    0.4    0.4    0.6    0.9     1.    1.1    1.2    1.2    1.4    1.4    1.2     1.     1.     1.    0.8
 0.9    0.8     1.    0.9

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.6    0.9     1.    1.2    1.4    1.4    1.5    1.4    1.4    1.4    1.4    1.5    1.3    1.4    1.4    1.3
 1.3    1.3    1.3    1.3
 DEGR. *     40     50     50     50     50     40     50     40     40      0      0    340    340    140    140    130
 130    130    140    140
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	REC101	REC102	REC103	REC104	REC105	REC106	REC107	REC108	REC109	REC110	REC111	REC112	REC113	REC114	REC115	REC116

REC117

.	*	1.1	1.1	1.1	1.2	1.3	0.	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
10.	*	1.1	1.2	1.3	1.3	1.4	0.	0.	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.4	0.3	0.3
20.	*	1.2	1.3	1.2	1.2	1.2	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.3
30.	*	1.1	1.	1.	1.1	1.2	0.	0.	0.	0.	0.	0.	0.1	0.1	0.2	0.3	0.3	0.3
40.	*	1.	1.	1.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.3	0.4
50.	*	0.9	0.9	1.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.4
60.	*	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.3
70.	*	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2
80.	*	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90.	*	0.9	0.9	0.9	0.9	0.7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100.	*	1.	1.	0.9	0.9	0.6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
110.	*	1.1	1.1	1.	0.9	0.6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
120.	*	1.1	1.1	1.1	0.9	0.6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.
130.	*	1.2	1.2	1.1	0.8	0.7	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1
140.	*	1.1	1.1	0.9	0.8	0.7	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3
150.	*	1.	0.9	0.9	0.8	0.6	0.2	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.7	0.7
160.	*	0.8	0.7	0.7	0.6	0.5	0.5	0.6	0.6	0.8	0.8	0.9	1.1	1.2	1.2	1.3	1.3	1.3
170.	*	0.4	0.4	0.4	0.3	0.3	0.7	0.8	0.9	0.9	1.3	1.3	1.3	1.5	1.6	1.6	1.6	1.6
180.	*	0.1	0.1	0.1	0.1	0.	0.6	0.7	0.8	1.1	1.2	1.4	1.4	1.5	1.6	1.6	1.6	1.5
190.	*	0.1	0.1	0.1	0.1	0.	0.6	0.7	1.	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.5	1.5
200.	*	0.1	0.1	0.1	0.	0.	0.6	0.8	1.	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.2
210.	*	0.	0.	0.	0.	0.	0.4	0.8	0.9	1.	1.2	1.3	1.3	1.2	1.2	1.2	1.2	1.1
220.	*	0.	0.	0.	0.	0.	0.5	0.8	0.9	1.	1.	1.	1.	1.2	1.2	1.2	1.2	0.9
230.	*	0.	0.	0.	0.	0.	0.6	0.9	1.	1.	1.	1.	1.	1.1	1.2	1.2	1.2	0.8
240.	*	0.	0.	0.	0.	0.	0.6	0.9	1.	1.	1.	1.	1.	1.	1.2	1.2	1.2	0.8
250.	*	0.	0.	0.	0.	0.	0.9	1.	1.	1.	1.	1.	1.	1.	1.	1.2	1.2	0.4
260.	*	0.	0.	0.	0.	0.	0.9	1.	1.	1.	1.	1.	1.	1.	1.2	1.2	1.2	0.5
270.	*	0.	0.	0.	0.	0.	1.	1.	1.	1.	1.	1.	1.	1.	1.2	1.2	1.1	0.6
280.	*	0.	0.	0.	0.	0.	1.	1.	1.	1.	1.	1.	1.	1.2	1.2	1.4	1.3	0.9
290.	*	0.	0.	0.	0.	0.	1.	1.	1.	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.4	0.9
300.	*	0.1	0.1	0.1	0.1	0.1	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.5	1.5	1.4	1.	0.6
310.	*	0.1	0.1	0.1	0.1	0.1	1.3	1.3	1.3	1.3	1.3	1.4	1.5	1.4	1.4	1.5	1.	1.
320.	*	0.3	0.2	0.2	0.2	0.2	1.5	1.5	1.5	1.4	1.4	1.6	1.6	1.6	1.6	1.2	1.2	1.
330.	*	0.6	0.5	0.6	0.6	0.6	1.2	1.4	1.4	1.4	1.4	1.6	1.6	1.5	1.4	1.1	1.	1.
340.	*	1.1	1.1	1.2	1.2	1.2	0.8	0.8	0.9	1.	1.	0.8	0.9	0.9	0.8	0.9	0.7	0.8
350.	*	1.3	1.2	1.3	1.4	1.4	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.3
360.	*	1.1	1.1	1.1	1.2	1.3	0.	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3

MAX	*	1.3	1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.4	1.4	1.6	1.6	1.6	1.6	1.6	1.6	1.6
DEGR.	*	350	20	10	350	10	320	320	320	320	320	320	320	320	170	170	170	170

THE HIGHEST CONCENTRATION OF 1.60 ppm OCCURRED AT RECEPTOR REC114.

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**********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/11/2012 11:35:01 AM
** File: F:\2975 FirstLight\Microscale\Worst\12 Hart & County LOS\2022NBSA.ou2
**
**********************************************


                    CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                    PAGE  1

     JOB: First Light - Taunton - Hart & County Sts- 2022 No Build Sat            RUN: CAL3QHC
     RUN

     DATE : 12/11/12
     TIME : 11:34:58

        The MODE flag has been set to C for calculating CO averages.

      SITE & METEOROLOGICAL VARIABLES
      -------------------------------
      VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 100. CM
       U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  0.0 PPM

      LINK VARIABLES
      --------------
                 LINK DESCRIPTION               *              LINK COORDINATES (M)              *    LENGTH  BRG TYPE
                 VPH    EF      H     W    V/C QUEUE
                                               *       X1          Y1            X2          Y2    *     (M)
                                              (DEG)            (G/MI)   (M)   (M)       (VEH)

     ------------------------------------------*-------------------------------------------------*------------------------
     ---------------------------------
      1. Hart EB TL                            *  235870.27    848335.69   235946.16    848348.19 *      77.    81. AG
      219.   8.5   0.0    9.4
      2. Hart EB TL QUEUE                      *  235946.16    848348.19   235909.78    848342.19 *      37.   261. AG
      94. 100.0   0.0    3.4 0.63   6.1
      3. Hart EB RL                            *  235910.48    848343.12   235945.62    848345.50 *      35.    86. AG
```

```
 341.   8.5   0.0    9.0
 4. Hart EB RL QUEUE                  *  235945.62    848345.50   235902.53    848342.56 *      43.   266. AG
 71. 100.0   0.0    3.0 0.48   7.2
 5. Hart WB LT                        *  236039.62    848367.12   235970.39    848354.56 *      70.   260. AG
 254.   8.5   0.0    9.4
 6. Hart WB LT QUEUE                  *  235970.39    848354.56   236012.45    848362.19 *      43.    80. AG
 94. 100.0   0.0    3.4 0.74   7.1
 7. Hart WB RL                        *  236019.66    848365.25   235969.06    848357.75 *      51.   262. AG
 170.   8.5   0.0    9.0
 8. Hart WB RL QUEUE                  *  235969.06    848357.75   235992.61    848361.25 *      24.    82. AG
 78. 100.0   0.0    3.0 0.29   4.0
 9. 140 NB L                          *  235982.64    848282.94   235962.94    848336.75 *      57.   340. AG
 235.   8.5   0.0    9.4
10. 140 NB L QUEUE                    *  235962.94    848336.75   236033.86    848143.06 *     206.   160. AG
104. 100.0   0.0    3.4 1.26  34.4
11. 140 NB TRL                        *  235983.98    848285.06   235965.06    848337.00 *      55.   340. AG
827.   8.5   0.0    9.0
12. 140 NB TRL QUEUE                  *  235965.06    848337.00   236414.20    847104.19 *    1312.   160. AG
88. 100.0   0.0    3.0 1.85 218.7
13. 140 SB LL                         *  235919.00    848421.94   235949.36    848359.12 *      70.   154. AG
115.   8.5   0.0    9.4
14. 140 SB LL QUEUE                   *  235949.36    848359.12   235875.14    848512.69 *     171.   334. AG
112. 100.0   0.0    3.4 1.62  28.4
15. 140 SB TR                         *  235919.53    848419.00   235945.62    848359.38 *      65.   156. AG
819.   8.5   0.0    9.4
16. 140 SB TR QUEUE                   *  235945.62    848359.38   235265.25    849914.06 *    1697.   336. AG
96. 100.0   0.0    3.4 2.59 282.8
17. Hart EB OUTBOUND                  *  235965.73    848350.19   236039.41    848363.12 *      75.    80. AG
437.   8.5   0.0    9.4
18. Hart WB OUTBOUND                  *  235941.72    848352.06   235869.94    848338.81 *      73.   260. AG
481.   8.5   0.0    9.4
19. 140 NB OUTBOUND                   *  235952.52    848359.88   235923.64    848423.31 *      70.   336. AG
894.   8.5   0.0    9.4
20. 140 SB OUTBOUND                   *  235956.02    848338.31   235978.42    848283.25 *      59.   158. AG
1258.   8.5   0.0    9.4
21. EBL                               *  235946.53    848348.12   235953.55    848359.31 *      13.    32. AG
61.   9.4   0.0    9.0
22. EBT                               *  235946.27    848348.31   235965.38    848350.44 *      19.    84. AG
158.   8.5   0.0    9.0
23. EBR                               *  235944.44    848346.44   235956.19    848338.50 *      14.   124. AG
```

341. 10.3 0.0 9.0
24. WBL * 235969.30 848354.88 235956.00 848339.56 * 20. 221. AG
133. 9.4 0.0 9.0
25. WBT * 235969.11 848354.62 235942.53 848351.69 * 27. 264. AG
121. 8.5 0.0 9.0
26. WBR * 235967.92 848357.19 235952.72 848359.31 * 15. 278. AG
170. 10.3 0.0 9.0
27. NBL * 235962.92 848337.50 235942.34 848352.00 * 25. 305. AG
235. 9.4 0.0 9.0
28. NBT * 235964.83 848337.69 235952.81 848359.44 * 25. 331. AG
663. 8.5 0.0 9.0
29. NBR * 235964.45 848338.56 235967.66 848350.31 * 12. 15. AG
164. 10.3 0.0 9.0
30. SBL * 235949.27 848359.25 235965.19 848350.25 * 18. 119. AG
115. 9.4 0.0 9.0
31. SBT * 235945.70 848359.44 235956.09 848338.94 * 23. 153. AG
784. 8.5 0.0 9.0
32. SBR * 235946.34 848359.62 235939.53 848350.81 * 11. 218. AG
35. 10.3 0.0 9.0

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JOB: First Light - Taunton - Hart & County Sts- 2022 No Build Sat RUN: CAL3QHC
RUN

DATE : 12/11/12
TIME : 11:34:58

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Hart EB TL QUEUE	*	132	101	5.0	219	1900	45.89	2	3
4. Hart EB RL QUEUE	*	132	76	5.0	341	1900	45.89	2	3
6. Hart WB LT QUEUE	*	132	101	5.0	254	1900	45.89	2	3
8. Hart WB RL QUEUE	*	132	84	5.0	170	1900	45.89	2	3
10. 140 NB L QUEUE	*	132	112	5.0	235	1900	45.89	2	3

12. 140 NB TRL QUEUE	*	132	94	5.0	827	1900	45.89	2	3
14. 140 SB LL QUEUE	*	132	120	5.0	115	1900	45.89	2	3
16. 140 SB TR QUEUE	*	132	103	5.0	819	1900	45.89	2	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z
1. LR_1	*	235961.95	848360.62	1.8
2. LR_2	*	235956.00	848363.88	1.8
3. LR_3	*	235953.88	848368.38	1.8
4. LR_4	*	235951.77	848372.94	1.8
5. LR_5	*	235949.66	848377.50	1.8
6. LR_6	*	235947.55	848382.00	1.8
7. LR_7	*	235945.42	848386.50	1.8
8. LR_8	*	235943.31	848391.06	1.8
9. LR_9	*	235941.19	848395.56	1.8
10. LR_10	*	235939.06	848400.12	1.8
11. LR_11	*	235936.95	848404.62	1.8
12. LR_12	*	235934.84	848409.19	1.8
13. LR_13	*	235932.73	848413.69	1.8
14. LR_14	*	235930.61	848418.25	1.8
15. LR_15	*	235928.50	848422.75	1.8
16. LR_16	*	235913.59	848419.25	1.8
17. LR_17	*	235915.72	848414.69	1.8
18. LR_18	*	235917.83	848410.19	1.8
19. LR_19	*	235919.95	848405.62	1.8
20. LR_20	*	235922.06	848401.12	1.8
21. LR_21	*	235924.19	848396.56	1.8
22. LR_22	*	235926.30	848392.06	1.8
23. LR_23	*	235928.41	848387.50	1.8
24. LR_24	*	235930.52	848383.00	1.8
25. LR_25	*	235932.64	848378.50	1.8
26. LR_26	*	235934.75	848373.94	1.8
27. LR_27	*	235936.88	848369.44	1.8
28. LR_28	*	235938.98	848364.88	1.8
29. LR_29	*	235941.09	848360.31	1.8
30. LR_31	*	235969.44	848342.38	1.8
31. LR_32	*	235970.98	848345.12	1.8

32. LR_33	*	235975.58	848347.31	1.8 *
33. LR_34	*	235980.50	848348.19	1.8 *
34. LR_35	*	235985.42	848349.12	1.8 *
35. LR_36	*	235990.34	848350.00	1.8 *
36. LR_37	*	235995.27	848350.94	1.8 *

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JOB: First Light - Taunton - Hart & County Sts- 2022 No Build Sat RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
37. LR_38	*	236000.19	848351.81	1.8 *
38. LR_39	*	236005.09	848352.69	1.8 *
39. LR_40	*	236010.02	848353.62	1.8 *
40. LR_41	*	236014.94	848354.50	1.8 *
41. LR_42	*	236019.84	848355.38	1.8 *
42. LR_43	*	236024.77	848356.31	1.8 *
43. LR_44	*	236029.69	848357.19	1.8 *
44. LR_45	*	236034.61	848358.12	1.8 *
45. LR_46	*	236039.53	848359.00	1.8 *
46. LR_47	*	236041.47	848373.19	1.8 *
47. LR_48	*	236036.55	848372.31	1.8 *
48. LR_49	*	236031.62	848371.44	1.8 *
49. LR_50	*	236026.70	848370.50	1.8 *
50. LR_51	*	236021.80	848369.62	1.8 *
51. LR_52	*	236016.88	848368.69	1.8 *
52. LR_53	*	236011.95	848367.81	1.8 *
53. LR_54	*	236007.05	848366.94	1.8 *
54. LR_55	*	236002.12	848366.00	1.8 *
55. LR_56	*	235997.20	848365.12	1.8 *
56. LR_57	*	235992.28	848364.25	1.8 *
57. LR_58	*	235987.38	848363.31	1.8 *
58. LR_59	*	235982.45	848362.44	1.8 *
59. LR_60	*	235977.53	848361.50	1.8 *
60. LR_61	*	235972.61	848360.62	1.8 *
61. LR_62	*	235967.69	848359.75	1.8 *
62. LR_64	*	235938.45	848355.44	1.8 *
63. LR_65	*	235933.53	848354.56	1.8 *
64. LR_66	*	235928.59	848353.69	1.8 *

65. LR_67	*	235923.69	848352.88	1.8 *
66. LR_68	*	235918.75	848352.00	1.8 *
67. LR_69	*	235913.83	848351.12	1.8 *
68. LR_70	*	235908.91	848350.25	1.8 *
69. LR_71	*	235903.97	848349.44	1.8 *
70. LR_72	*	235899.05	848348.56	1.8 *
71. LR_73	*	235894.12	848347.69	1.8 *
72. LR_74	*	235889.20	848346.88	1.8 *
73. LR_75	*	235884.27	848346.00	1.8 *
74. LR_76	*	235879.34	848345.12	1.8 *
75. LR_77	*	235874.42	848344.25	1.8 *
76. LR_78	*	235869.48	848343.44	1.8 *
77. LR_79	*	235871.02	848332.75	1.8 *
78. LR_80	*	235875.95	848333.56	1.8 *
79. LR_81	*	235880.88	848334.44	1.8 *
80. LR_82	*	235885.80	848335.31	1.8 *
81. LR_83	*	235890.73	848336.12	1.8 *
82. LR_84	*	235895.66	848337.00	1.8 *
83. LR_85	*	235900.58	848337.88	1.8 *
84. LR_86	*	235905.50	848338.75	1.8 *
85. LR_87	*	235910.44	848339.56	1.8 *
86. LR_88	*	235915.36	848340.44	1.8 *
87. LR_89	*	235920.28	848341.31	1.8 *
88. LR_90	*	235925.38	848341.50	1.8 *
89. LR_91	*	235930.12	848341.56	1.8 *
90. LR_92	*	235935.22	848341.44	1.8 *
91. LR_93	*	235940.47	848342.31	1.8 *
92. LR_94	*	235945.70	848340.75	1.8 *
93. LR_96	*	235948.52	848339.25	1.8 *

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JOB: First Light - Taunton - Hart & County Sts- 2022 No Build Sat RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
94. LR_97	*	235952.20	848335.62	1.8 *
95. LR_98	*	235954.11	848331.00	1.8 *
96. LR_99	*	235956.02	848326.38	1.8 *
97. LR_100	*	235957.94	848321.75	1.8 *

98.	LR_101	*	235959.84	848317.12	1.8 *
99.	LR_102	*	235961.77	848312.50	1.8 *
**.	LR_103	*	235963.67	848307.88	1.8 *
**.	LR_104	*	235965.58	848303.25	1.8 *
**.	LR_105	*	235967.50	848298.69	1.8 *
**.	LR_106	*	235969.41	848294.06	1.8 *
**.	LR_107	*	235971.31	848289.44	1.8 *
**.	LR_108	*	235973.23	848284.81	1.8 *
**.	LR_109	*	235988.36	848288.12	1.8 *
**.	LR_110	*	235986.45	848292.75	1.8 *
**.	LR_111	*	235984.55	848297.38	1.8 *
**.	LR_112	*	235982.62	848302.00	1.8 *
**.	LR_113	*	235980.70	848306.62	1.8 *
**.	LR_114	*	235978.80	848311.25	1.8 *
**.	LR_115	*	235976.89	848315.88	1.8 *
**.	LR_116	*	235974.98	848320.50	1.8 *
**.	LR_117	*	235973.06	848325.12	1.8 *
**.	LR_118	*	235971.16	848329.75	1.8 *
**.	LR_119	*	235969.23	848334.38	1.8 *
**.	LR_120	*	235967.33	848339.00	1.8 *

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	*	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.7	0.8	0.8	1.	1.1

```
 10.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.7    0.9     1.    1.1
 20.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.7    0.9    1.1    1.1
 30.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.7    0.9     1.    1.1
 40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.5
 0.7    0.9     1.     1.
 50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.5
 0.8    0.9    0.9     1.
 60.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.9    0.9    0.8    0.8
 70.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.9    0.9    0.9    0.8
 80.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.7
 0.9    0.9    0.9     1.
 90.  *    0.7    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.8
 0.9    0.9    0.9     1.
100.  *    0.7    0.4    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.9
1.    1.1    1.1    1.1
110.  *    0.5    0.3    0.3    0.3    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.
1.1    1.1    1.1    1.1
120.  *    0.4    0.4    0.3    0.3    0.3    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     1.
1.1    1.1    1.1    1.1

------*-----------------------------------------------------------------------------------------------------------------
---------------------
MAX   *    0.7    0.4    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     1.
1.1    1.1    1.1    1.1
DEGR. *     90    100    100    110    120      0      0      0      0      0      0      0      0      0      0    110
110    100     20      0
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
130.	*	0.3	0.3	0.2	0.3	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	1.1	1.1	1.1	1.2	1.2
140.	*	0.2	0.2	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	1.1	1.2	1.2	1.2	1.4
150.	*	0.5	0.6	0.6	0.6	0.6	0.7	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	1.2	1.2	1.2	1.2	1.2
160.	*	0.8	1.	0.8	0.9	1.	1.	1.1	1.	1.	1.	1.	1.	1.1	1.1	1.2	0.8	0.8	0.7	0.7	0.7
170.	*	0.9	1.1	1.1	0.9	1.	0.9	1.2	1.2	1.2	1.1	1.1	1.2	1.4	1.3	1.3	0.2	0.2	0.2	0.1	0.1
180.	*	0.7	0.9	0.6	0.8	0.8	0.9	1.	0.8	1.	1.	1.1	1.1	1.1	1.1	1.1	0.	0.	0.	0.	0.1
190.	*	0.7	0.6	0.5	0.5	0.9	0.9	1.	1.1	1.1	1.2	1.1	1.1	1.1	1.1	1.1	0.	0.	0.	0.	0.
200.	*	0.5	0.5	0.6	0.9	1.	1.	1.	1.	1.	0.9	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
210.	*	0.4	0.5	0.6	1.	1.2	1.2	1.1	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
220.	*	0.4	0.6	1.1	0.9	1.2	1.1	1.	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
230.	*	0.5	0.7	1.1	1.	0.9	0.9	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
240.	*	0.6	0.9	1.	1.	1.	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.	0.	0.	0.	0.
250.	*	0.6	1.1	1.	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.	0.	0.	0.	0.
260.	*	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.8	0.6	0.	0.	0.	0.	0.
270.	*	0.7	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.6	0.	0.	0.	0.	0.

```
 280.  *    0.7    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.8    0.5     0.
 0.     0.     0.     0.
 290.  *    0.6     1.     1.     1.    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.7    0.5     0.
 0.     0.     0.     0.
 300.  *    0.8    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.     1.    0.9    0.9    0.7    0.6     0.
 0.     0.     0.     0.
 310.  *    0.9    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.     1.    0.9    0.8    0.7    0.6     0.
 0.     0.     0.     0.
 320.  *    0.8    1.1    1.2    1.2    1.2    1.2    1.1    1.1    1.1    1.1    1.1    0.9    0.9    0.8    0.7    0.2
 0.2    0.2    0.2    0.3
 330.  *    0.7    1.1    1.1    1.1     1.     1.     1.     1.     1.    0.8    0.8    0.8    0.7    0.7    0.6    0.4
 0.4    0.4    0.6    0.6
 340.  *    0.3    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.3    0.7
 0.7    0.8    0.9    0.9
 350.  *     0.    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.8
 0.8    0.9     1.    1.2
 360.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.    0.7
 0.8    0.8     1.    1.1

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.9    1.1    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.1    1.2    1.4    1.3    1.3    1.2
 1.2    1.2    1.2    1.4
 DEGR. *    170    170    320    320    210    210    170    170    170    190    170    170    170    170    170    150
 140    140    130    140
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36

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 REC37  REC38  REC39  REC40

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *    1.1    1.2    1.3    1.3    1.3    1.3    1.3    1.3    1.3    0.3    0.3    0.5    0.5    0.5    0.5    0.4
   0.4    0.4    0.4    0.2
  10.  *    1.1    1.1    1.1    1.1    1.1    1.2    1.2    1.2    1.3    0.3    0.3    0.5    0.5    0.5    0.5    0.4
  0.4    0.4    0.3    0.2
  20.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    0.3    0.5    0.5    0.5    0.5    0.4    0.4
  0.4    0.4    0.3    0.2
  30.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    0.4    0.5    0.5    0.5    0.5    0.4    0.4
  0.4    0.3    0.2    0.2
  40.  *     1.     1.    0.9    0.9    0.9    0.9    0.9    0.9     1.    0.5    0.5    0.6    0.6    0.5    0.5    0.5
  0.5    0.4    0.3    0.3
  50.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.5    0.6    0.6    0.5    0.5    0.5    0.5
  0.4    0.4    0.3    0.3
  60.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.3    0.5    0.5    0.5    0.5    0.4    0.4
  0.4    0.3    0.3    0.3
  70.  *    0.8    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.2    0.4    0.4    0.4    0.4    0.4    0.4
  0.3    0.2    0.2    0.2
  80.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.1    0.2    0.3    0.3    0.2    0.2    0.2
  0.2    0.2    0.2    0.1
  90.  *     1.     1.    0.9    0.9    0.9    0.9    0.9     1.    1.2     0.    0.1    0.1    0.1    0.1    0.1    0.1
  0.1    0.1    0.1    0.1
 100.  *    1.1    1.1    1.1    1.1    1.1    1.2    1.2    1.2     1.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 110.  *    1.1    1.1    1.1    1.2    1.2    1.2    1.2    1.2    0.6     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 120.  *    1.1    1.1    1.2    1.2    1.2    1.1    1.1    0.9    0.5     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 130.  *    1.2    1.2    1.1    1.1    1.2    1.1    1.1     1.    0.9     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 140.  *    1.4    1.5    1.3    1.4    1.5    1.4    1.2     1.     1.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 150.  *    1.1    1.1    1.2    1.2    1.1    1.1     1.    1.2    1.2    0.3    0.2    0.1     0.     0.     0.     0.
 0.     0.     0.     0.
 160.  *    0.7    0.7    0.7    0.7    0.8    0.8    0.8    0.6    0.9    0.8    0.6    0.3    0.2    0.2    0.1    0.1
 0.1    0.1    0.1    0.1
 170.  *    0.2    0.2    0.2    0.2    0.3    0.3    0.5    0.6    0.5    1.2    0.8    0.6    0.4    0.2    0.2    0.2
 0.2    0.2    0.1    0.1
```

```
180.  *    0.2    0.2    0.2    0.3    0.3    0.4    0.4    0.4    0.3    1.2     1.    0.7    0.6    0.4    0.2    0.2
0.2    0.2    0.2    0.2
190.  *     0.     0.    0.1    0.2    0.3    0.3    0.3    0.3    0.4    1.2    0.9    0.8    0.5    0.4    0.4    0.4
0.2    0.2    0.2    0.2
200.  *     0.     0.     0.    0.2    0.3    0.3    0.3    0.3    0.4    0.9    0.8    0.7    0.5    0.4    0.4    0.4
0.4    0.3    0.2    0.2
210.  *     0.     0.     0.    0.1    0.2    0.3    0.3    0.3    0.4    0.7    0.6    0.5    0.5    0.4    0.4    0.4
0.4    0.4    0.4    0.3
220.  *     0.     0.     0.     0.    0.1    0.1    0.3    0.3    0.5    0.6    0.6    0.5    0.4    0.4    0.4    0.4
0.4    0.4    0.4    0.4
230.  *     0.     0.     0.     0.    0.1    0.1    0.1    0.3    0.4    0.6    0.5    0.5    0.4    0.4    0.4    0.4
0.4    0.4    0.4    0.4
240.  *     0.     0.     0.     0.     0.     0.    0.1    0.1    0.4    0.4    0.3    0.2    0.2    0.2    0.3    0.3
0.3    0.3    0.2    0.3
250.  *     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.6    0.4    0.3    0.3    0.3    0.2    0.2
0.2    0.2    0.2    0.2
260.  *     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.8    0.6    0.5    0.5    0.5    0.4    0.3
0.2    0.3    0.3    0.3
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.9    0.8    0.6    0.6    0.6    0.6    0.5
0.3    0.4    0.5    0.6
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.8    0.7    0.5    0.4    0.5    0.4    0.5
0.6    0.7    0.7    0.6
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.6    0.4    0.6    0.8    0.7     1.     1.
1.     1.     1.    0.9
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.7    0.7    0.6    0.7     1.     1.     1.
1.     1.    0.8    0.8
310.  *     0.     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.8    0.7    0.6    0.7    0.9    0.9    0.9
0.8    0.8    0.6    0.6
320.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4     1.    0.9    0.8    0.9    0.8    0.8    0.7
0.7    0.6    0.6    0.5
330.  *    0.6    0.7    0.7    0.7    0.7    0.8    0.8    0.8    0.9    0.9    0.7    0.7    0.8    0.7    0.7    0.6
0.5    0.5    0.5    0.4
340.  *    0.9     1.    1.1    1.1    1.3    1.3    1.3    1.3    1.3    0.5    0.4    0.6    0.6    0.6    0.6    0.6
0.5    0.4    0.4    0.3
350.  *    1.2    1.2    1.3    1.4    1.5    1.5    1.5    1.5    1.5    0.1    0.3    0.5    0.5    0.5    0.5    0.4
0.4    0.4    0.4    0.3
360.  *    1.1    1.2    1.3    1.3    1.3    1.3    1.3    1.3    1.3    0.3    0.3    0.5    0.5    0.5    0.5    0.4
0.4    0.4    0.4    0.2

------*-----------------------------------------------------------------------------------------------------------------
```

```
 ---------------------
 MAX   *    1.4    1.5    1.3    1.4    1.5    1.5    1.5    1.5    1.5    1.2     1.    0.8    0.9     1.     1.     1.
 1.     1.     1.    0.9
 DEGR. *    140    140      0    140    140    350    350    350    350    170    180    190    320    300    290    290
 290    290    290    290
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

```
WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC41  REC42  REC43  REC44  REC45  REC46  REC47  REC48  REC49  REC50  REC51  REC52  REC53  REC54  REC55  REC56
REC57  REC58  REC59  REC60

------*-----------------------------------------------------------------------------------------------------------------
---------------------
   .  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
   0.     0.     0.     0.
 10.  *    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 20.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 30.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 40.  *    0.3    0.3    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 50.  *    0.3    0.3    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 60.  *    0.2    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 70.  *    0.2    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.1    0.1    0.2    0.2
```

```
 80.  *    0.1    0.1    0.1    0.1    0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.2    0.2    0.3
 0.3    0.4    0.6    0.6
 90.  *    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.3    0.3    0.4    0.4
 0.6    0.7    0.8    0.8
100.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.2    0.2    0.3    0.4    0.5    0.5
0.6    0.8    0.9     1.
110.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.3    0.4    0.5    0.5
0.8    0.9    0.9     1.
120.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.4    0.5    0.5    0.6
0.8    0.9    0.9    0.9
130.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.4    0.5    0.5    0.5
0.7    0.8    0.8    0.8
140.  *     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.5    0.5    0.5    0.5
0.8    0.7    0.7    0.8
150.  *     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.4    0.4    0.4    0.4
0.6    0.7    0.7    0.8
160.  *     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.3    0.5    0.5    0.5    0.6
0.7    0.8    0.9     1.
170.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.3    0.4    0.5    0.6    0.6    0.7
0.8    0.9    1.1    1.3
180.  *    0.2    0.2    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.4    0.4    0.5    0.6    0.6    0.6    0.7
0.9    1.1    1.2    1.3
190.  *    0.2    0.2    0.2    0.2    0.2    0.1    0.4    0.4    0.4    0.4    0.5    0.6    0.6    0.6    0.6     1.
1.1    1.1    1.1    1.2
200.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.4    0.4    0.4    0.4    0.6    0.7    0.8    0.9    0.9    1.1
1.1    1.1    1.1    1.1
210.  *    0.2    0.2    0.2    0.1    0.1    0.3    0.3    0.3    0.3    0.5    0.7    0.9    0.9     1.     1.    1.2
1.2    1.2     1.    0.7
220.  *    0.4    0.3    0.2    0.1    0.1    0.3    0.3    0.4    0.4    0.5    0.8     1.     1.     1.    1.1    1.2
1.1    0.9     1.    0.5
230.  *    0.3    0.3    0.2    0.2    0.2    0.3    0.3    0.4    0.4    0.5    0.6    0.7    0.7    0.8    0.9     1.
0.9     1.    0.8    0.4
240.  *    0.3    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.5    0.6    0.6    0.7    0.7    0.7    0.9
0.9    0.9    0.8    0.6
250.  *    0.2    0.2    0.2    0.1    0.1    0.3    0.3    0.3    0.5    0.6    0.6    0.6    0.6    0.7    0.7    0.9
0.9    0.8    0.7    0.7
260.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.5    0.4
0.4    0.6    0.5    0.6
270.  *    0.6    0.5    0.4    0.4    0.4     0.     0.     0.     0.1    0.1    0.2    0.2    0.3    0.4    0.4    0.4
0.4    0.5    0.5    0.4
```

```
 280.  *    0.6    0.5    0.4    0.4    0.4    0.1    0.1    0.1    0.2    0.2    0.3    0.3    0.4    0.4    0.4    0.4
 0.4    0.4    0.4    0.4
 290.  *    0.8    0.7    0.6    0.6    0.4    0.1    0.2    0.2    0.2    0.2    0.3    0.3    0.4    0.4    0.4    0.4
 0.4    0.4    0.4    0.4
 300.  *    0.7    0.6    0.5    0.5    0.5    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.4
 0.4    0.4    0.4    0.5
 310.  *    0.5    0.4    0.4    0.4    0.3    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.3
 0.3    0.4    0.4    0.5
 320.  *    0.4    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2
 0.2    0.3    0.3    0.6
 330.  *    0.3    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.2    0.2    0.4
 340.  *    0.2    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 350.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 360.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.8    0.7    0.6    0.6    0.5    0.3    0.4    0.4    0.5    0.6    0.8     1.     1.     1.    1.1    1.2
 1.2    1.2    1.2    1.3
 DEGR. *    290    290    290    290    300    210    190    190    250    250    220    220    220    210    220    210
 210    210    180    170
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
*	REC61	REC62	REC63	REC64	REC65	REC66	REC67	REC68	REC69	REC70	REC71	REC72	REC73	REC74	REC75	REC76

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REC77  REC78  REC79  REC80

------*-------------------------------------------------------------------------------------------------------------------------------
---------------------
   .  *     0.     1.    0.7    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1
   0.2    0.3    0.3    0.4
 10.  *     0.    0.8    0.7    0.5    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2
 0.4    0.4    0.4    0.4
 20.  *     0.    0.8    0.7    0.4    0.4    0.4    0.4    0.4    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.2
 0.4    0.4    0.4    0.4
 30.  *     0.    0.8    0.7    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.2    0.2    0.2    0.2    0.2
 0.4    0.4    0.4    0.4
 40.  *     0.    0.8    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.2
 0.4    0.5    0.5    0.7
 50.  *     0.    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.1
 0.4    0.4    0.4    0.5
 60.  *     0.    0.5    0.4    0.4    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.3    0.2    0.1
 0.3    0.3    0.3    0.5
 70.  *    0.3    0.5    0.6    0.6    0.5    0.5    0.5    0.5    0.3    0.2    0.2    0.1    0.1    0.1    0.1    0.1
 0.5    0.5    0.5    0.5
 80.  *    0.7    0.7    0.4    0.3    0.3    0.4    0.2    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.4
 0.4    0.4    0.4    0.4
 90.  *    0.9    0.6    0.5    0.5    0.6    0.5    0.5    0.6    0.5    0.5    0.6    0.5    0.5    0.5    0.5    0.5
 0.2    0.2    0.3    0.3
100.  *     1.    0.5    0.3    0.5    0.6    0.6    0.8    0.7    0.8    0.8    0.9    0.6    0.6    0.6    0.6    0.4
0.2    0.2    0.2    0.2
110.  *    0.9    0.5    0.5    0.7    0.9    0.8    0.9     1.     1.     1.    0.8    0.7    0.6    0.5    0.5    0.5
0.2    0.2    0.2    0.2
120.  *    0.9    0.7     1.    1.2    1.1    1.1    1.2    1.2    1.1    0.9    0.8    0.7    0.6    0.5    0.4    0.4
0.1    0.1    0.1    0.2
130.  *    0.6    1.1    1.1    1.1    1.1    1.1    1.2    1.1    1.1    0.9    0.6    0.5    0.5    0.5    0.5    0.5
0.2    0.2    0.2    0.2
140.  *    0.6    1.1     1.    1.1    0.9    0.9    0.9    0.8    0.7    0.5    0.4    0.4    0.4    0.3    0.3    0.3
0.1    0.1    0.1    0.1
150.  *    0.5    1.3    0.8    0.9    0.9    0.8    0.8    0.8    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.2
0.1    0.1    0.1    0.1
160.  *    0.8    0.8    0.8    0.8    0.7    0.7    0.7    0.6    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.1
0.     0.     0.     0.
170.  *    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1
0.     0.     0.     0.
```

```
 180.  *    0.8    0.6    0.6    0.6    0.6    0.6    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1
 0.     0.     0.     0.
 190.  *    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.1     0.
 0.     0.     0.     0.
 200.  *    0.3    0.7    0.6    0.6    0.6    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1     0.
 0.     0.     0.     0.
 210.  *    0.4    0.7    0.7    0.7    0.7    0.7    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.1    0.1     0.
 0.     0.     0.     0.
 220.  *    0.3    0.7    0.7    0.7    0.7    0.6    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.1    0.1     0.
 0.     0.     0.     0.
 230.  *    0.3    0.7    0.7    0.7    0.6    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1     0.
 0.     0.     0.     0.
 240.  *    0.5    0.8    0.6    0.6    0.5    0.4    0.4    0.3    0.3    0.3    0.3    0.2    0.2    0.1    0.1     0.
 0.     0.     0.     0.
 250.  *    0.6    0.6    0.6    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1     0.
 0.     0.     0.    0.1
 260.  *    0.6    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1     0.
 0.     0.    0.1    0.1
 270.  *    0.7    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.
 0.     0.    0.2    0.2
 280.  *    0.5    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 290.  *    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 300.  *    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 310.  *    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 320.  *    0.7     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 330.  *    0.4    0.4    0.2    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 340.  *    0.2    0.8    0.4    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.3    0.3    0.3
 350.  *     0.    0.9    0.6    0.5    0.3    0.3    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.2    0.3    0.3    0.3
 360.  *     0.     1.    0.7    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1
 0.2    0.3    0.3    0.4

------*-----------------------------------------------------------------------------------------------------------------
```

```
 ---------------------
MAX   *     1.    1.3    1.1    1.2    1.1    1.1    1.2    1.2    1.1     1.    0.9    0.7    0.6    0.6    0.6    0.5
0.5    0.5    0.5    0.7
DEGR. *    100    150    130    120    120    120    120    120    120    110    100    110    100    100    100     90
70     40     40     40
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC81  REC82  REC83  REC84  REC85  REC86  REC87  REC88  REC89  REC90  REC91  REC92  REC93  REC94  REC95  REC96
REC97  REC98  REC99  REC100

------*-------------------------------------------------------------------------------------------------------------
---------------------
   .  *    0.4    0.4    0.4    0.6    0.8     1.    1.1    1.2    1.3    1.3    1.4    1.1     1.     1.     1.    0.8
  0.8    0.8    0.9    0.9
 10.  *    0.4    0.4    0.4    0.6    1.1    1.2    1.2    1.2    1.2    1.2    1.2    0.9    0.7    0.7    0.7    0.6
 0.7    0.9    0.9     1.
 20.  *    0.4    0.4    0.6    0.8    1.2    1.2    1.2    1.2    1.2    1.1    1.1    0.7    0.6    0.6    0.6    0.5
 0.8    0.9    1.2    1.2
 30.  *    0.4    0.6    0.7    0.9    1.3    1.3    1.4    1.3    1.2    1.2     1.    0.5    0.5    0.6    0.5    0.7
 0.9    1.1    1.1    1.1
 40.  *    0.7    0.8    0.9     1.    1.4    1.5    1.4    1.4    1.3     1.    0.9    0.5    0.5    0.7    0.7     1.
 1.    1.1    1.1     1.
 50.  *    0.8    0.8     1.    1.2    1.5    1.6    1.5    1.2    1.1    0.8    0.8    0.5    0.7    0.9    0.8    0.9
 1.    0.9     1.     1.
 60.  *    0.5    0.6    0.8     1.    1.2    1.2    1.3    1.1    1.1    0.9    0.9    0.8    0.8    0.8     1.     1.
 0.9    0.9     1.     1.
 70.  *    0.5    0.8    0.7     1.    1.2    1.3    1.3    1.3     1.    0.9    0.8    0.7    0.7    0.6    0.8    0.9
 1.     1.     1.     1.
```

```
 80.  *    0.4    0.7    0.7    0.8     1.     1.    1.1     1.    0.9    0.7    0.7    0.7    0.8    0.6    0.8    0.9
 0.9     1.     1.     1.
 90.  *    0.3    0.3    0.4    0.5    0.6    0.6    0.7    0.6    0.6    0.5    0.5    0.5    0.5    0.6    0.9     1.
 1.     1.     1.     1.
100.  *    0.2    0.2    0.3    0.4    0.5    0.6    0.6    0.4    0.4    0.6    0.7    0.8    0.8    0.8     1.     1.
1.     1.     1.     1.
110.  *    0.2    0.3    0.3    0.4    0.4    0.5    0.5    0.5    0.4    0.5    0.7    0.7    0.8    0.9     1.     1.
1.     1.     1.     1.
120.  *    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.5    0.5    0.6    0.7    0.8    1.2    1.2    1.2
1.2    1.2    1.2    1.2
130.  *    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.4    0.5    0.5    0.7    0.8    1.1    1.3    1.2    1.2
1.2    1.2    1.2    1.2
140.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.5    0.6    0.9    0.9    1.4    1.4    1.4
1.3    1.3    1.3    1.1
150.  *    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.3    0.3    0.6    0.8    0.9    1.1    1.1    1.2
1.2    1.2    1.1    1.1
160.  *     0.     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.4    0.5    0.9    0.9    0.8
0.8    0.8    0.8    0.8
170.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.4    0.4    0.4
0.4    0.4    0.4    0.4
180.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1
0.1    0.1    0.1    0.1
190.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1
0.1    0.1    0.1    0.1
200.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
210.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
240.  *     0.     0.     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
250.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.2    0.1    0.2     0.     0.     0.     0.     0.
0.     0.     0.     0.
260.  *    0.2    0.2    0.2    0.2    0.2    0.5    0.5    0.5    0.5    0.5    0.5    0.3     0.     0.     0.     0.
0.     0.     0.     0.
270.  *    0.2    0.2    0.2    0.2    0.2    0.5    0.9    0.7    0.7    0.7    0.9    0.6    0.5    0.2     0.     0.
0.     0.     0.     0.
```

```
 280.  *    0.2    0.2    0.3    0.3    0.4    0.8    1.1     1.     1.     1.     1.    0.7    0.7    0.4    0.3     0.
 0.     0.     0.     0.
 290.  *    0.2    0.3    0.3    0.3    0.4    0.9    1.1    1.1    0.9    0.9     1.    0.7    0.7    0.4    0.3    0.3
 0.     0.     0.     0.
 300.  *    0.2    0.3    0.3    0.3    0.5     1.    1.1     1.    0.9    0.9    0.9    0.7    0.8    0.6    0.4    0.3
 0.3    0.2    0.1    0.1
 310.  *    0.2    0.2    0.2    0.3    0.4    0.9     1.    0.9    0.9    0.8    0.9    0.8    0.8    0.5    0.4    0.4
 0.3    0.3    0.3    0.2
 320.  *    0.2    0.2    0.2    0.3    0.4    0.8    0.9    0.9    0.8    0.8    0.8    0.8    0.7    0.6    0.5    0.4
 0.4    0.3    0.2    0.2
 330.  *    0.2    0.2    0.2    0.3    0.5    0.8    0.9    0.9    0.9    0.8    0.9    1.2    0.8    1.1    0.9     1.
 0.9    0.8    0.7    0.6
 340.  *    0.3    0.3    0.3    0.5    0.6    0.9     1.     1.    1.1    1.1    1.3    1.4    1.3    1.1    1.2    1.1
 1.    1.1     1.    1.1
 350.  *    0.3    0.3    0.3    0.6    0.8     1.     1.    1.1    1.2    1.3    1.4    1.6    1.3    1.2    1.3     1.
 1.    1.1    1.2    1.2
 360.  *    0.4    0.4    0.4    0.6    0.8     1.    1.1    1.2    1.3    1.3    1.4    1.1     1.     1.     1.    0.8
 0.8    0.8    0.9    0.9

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.8    0.8     1.    1.2    1.5    1.6    1.5    1.4    1.3    1.3    1.4    1.6    1.3    1.4    1.4    1.4
 1.3    1.3    1.3    1.2
 DEGR. *     50     40     50     50     50     50     50     40      0      0      0    350    340    140    140    140
 140    140    140     20
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	REC101	REC102	REC103	REC104	REC105	REC106	REC107	REC108	REC109	REC110	REC111	REC112	REC113	REC114	REC115	REC116

REC117

.	*	1.1	1.1	1.2	1.2	1.3	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3
10.	*	1.1	1.2	1.2	1.2	1.3	0.	0.	0.	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.3	0.5
20.	*	1.3	1.3	1.2	1.2	1.2	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.4
30.	*	1.1	1.	1.1	1.1	1.1	0.	0.	0.	0.	0.	0.	0.1	0.1	0.2	0.2	0.3	0.3
40.	*	1.	1.	1.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.2	0.3
50.	*	1.	1.	1.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.4
60.	*	1.	1.	1.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2
70.	*	1.	1.	1.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2
80.	*	1.	1.	1.	1.	0.8	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90.	*	1.	1.	1.	0.9	0.7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100.	*	1.	1.	1.	0.9	0.6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
110.	*	1.1	1.1	1.	0.9	0.6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
120.	*	1.2	1.1	1.	0.9	0.6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.
130.	*	1.2	1.1	1.	0.8	0.7	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1
140.	*	1.1	1.1	0.9	0.8	0.6	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3
150.	*	1.	0.9	0.8	0.8	0.6	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.7
160.	*	0.7	0.7	0.7	0.6	0.5	0.5	0.6	0.6	0.7	0.8	1.	1.1	1.3	1.3	1.3	1.3	1.4
170.	*	0.4	0.4	0.4	0.3	0.2	0.7	0.8	0.9	0.9	1.2	1.3	1.4	1.5	1.6	1.6	1.7	1.6
180.	*	0.1	0.1	0.1	0.1	0.	0.6	0.7	0.8	1.2	1.2	1.5	1.5	1.5	1.6	1.6	1.6	1.7
190.	*	0.1	0.1	0.1	0.1	0.	0.6	0.7	1.	1.2	1.2	1.2	1.4	1.4	1.5	1.5	1.6	1.5
200.	*	0.	0.	0.	0.	0.	0.6	0.8	1.1	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
210.	*	0.	0.	0.	0.	0.	0.5	0.7	1.	1.1	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.1
220.	*	0.	0.	0.	0.	0.	0.5	0.8	0.9	1.	1.	1.1	1.2	1.3	1.3	1.3	1.3	1.
230.	*	0.	0.	0.	0.	0.	0.6	0.9	0.9	1.	1.	1.	1.	1.1	1.2	1.2	1.2	0.8
240.	*	0.	0.	0.	0.	0.	0.6	0.9	0.9	1.	1.	1.	1.	1.1	1.2	1.2	1.2	0.7
250.	*	0.	0.	0.	0.	0.	0.9	0.9	1.	1.1	1.	1.	1.	1.	1.1	1.2	1.2	0.4
260.	*	0.	0.	0.	0.	0.	0.9	1.	1.	1.	1.	1.	1.	1.1	1.2	1.2	1.1	0.4
270.	*	0.	0.	0.	0.	0.	0.9	1.	1.	1.	1.	1.	1.	1.1	1.2	1.2	1.	0.9
280.	*	0.	0.	0.	0.	0.	1.	1.	1.	1.	1.1	1.1	1.2	1.3	1.3	1.3	1.3	0.9
290.	*	0.	0.	0.	0.	0.	1.1	1.1	1.1	1.3	1.3	1.3	1.3	1.4	1.5	1.4	1.4	0.8
300.	*	0.1	0.1	0.1	0.1	0.1	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.5	1.4	1.5	1.1	0.8
310.	*	0.1	0.1	0.1	0.1	0.1	1.3	1.3	1.3	1.3	1.3	1.4	1.3	1.4	1.4	1.5	1.	1.
320.	*	0.3	0.2	0.2	0.2	0.2	1.6	1.6	1.6	1.5	1.5	1.6	1.8	1.6	1.6	1.1	1.1	1.1
330.	*	0.5	0.5	0.5	0.6	0.6	1.4	1.5	1.5	1.6	1.5	1.6	1.6	1.5	1.4	1.1	1.	1.1
340.	*	1.1	1.1	1.1	1.2	1.2	0.9	0.9	1.	1.	0.9	0.8	0.9	0.9	0.8	0.9	0.8	0.8
350.	*	1.2	1.2	1.2	1.3	1.3	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.2	0.3
360.	*	1.1	1.1	1.2	1.2	1.3	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3

MAX	*	1.3	1.3	1.2	1.3	1.3	1.6	1.6	1.6	1.6	1.5	1.6	1.8	1.6	1.6	1.6	1.7	1.7
DEGR.	*	20	20	0	350	0	320	320	320	330	320	320	320	320	170	170	170	180

THE HIGHEST CONCENTRATION OF 1.80 ppm OCCURRED AT RECEPTOR REC112.

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**********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/11/2012 11:29:28 AM
** File: F:\2975 FirstLight\Microscale\Worst\12 Hart & County LOS\2022AAM.ou2
**
**********************************************


                    CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                    PAGE  1

     JOB: First Light - Taunton - Hart & County Sts- 2022  Build A AM             RUN: CAL3QHC
     RUN

     DATE : 12/11/12
     TIME : 11:29:26

        The MODE flag has been set to C for calculating CO averages.

      SITE & METEOROLOGICAL VARIABLES
      -------------------------------
      VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 100. CM
       U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  0.0 PPM

      LINK VARIABLES
      --------------
                 LINK DESCRIPTION               *              LINK COORDINATES (M)              *    LENGTH  BRG TYPE
                 VPH    EF      H     W    V/C QUEUE
                                               *       X1          Y1            X2          Y2    *     (M)
                                              (DEG)            (G/MI)   (M)   (M)       (VEH)

     ------------------------------------------*-------------------------------------------------*------------------------
     ---------------------------------
      1. Hart EB TL                            *  235870.27    848335.69   235946.16    848348.19 *      77.    81. AG
      230.   8.5   0.0    9.4
      2. Hart EB TL QUEUE                      *  235946.16    848348.19   235907.95    848341.88 *      39.   261. AG
      94. 100.0   0.0    3.4 0.67   6.5
      3. Hart EB RL                            *  235910.48    848343.12   235945.62    848345.50 *      35.    86. AG
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 277.   8.5   0.0    9.0
 4. Hart EB RL QUEUE                  *  235945.62    848345.50   235909.70    848343.06 *      36.   266. AG
 73. 100.0   0.0    3.0 0.41   6.0
 5. Hart WB LT                        *  236039.62    848367.12   235970.39    848354.56 *      70.   260. AG
 225.   8.5   0.0    9.4
 6. Hart WB LT QUEUE                  *  235970.39    848354.56   236007.66    848361.31 *      38.    80. AG
 94. 100.0   0.0    3.4 0.65   6.3
 7. Hart WB RL                        *  236019.66    848365.25   235969.06    848357.75 *      51.   262. AG
 103.   8.5   0.0    9.0
 8. Hart WB RL QUEUE                  *  235969.06    848357.75   235982.98    848359.81 *      14.    81. AG
 76. 100.0   0.0    3.0 0.17   2.3
 9. 140 NB L                          *  235982.64    848282.94   235962.94    848336.75 *      57.   340. AG
 131.   8.5   0.0    9.4
10. 140 NB L QUEUE                    *  235962.94    848336.75   235972.34    848311.06 *      27.   160. AG
106. 100.0   0.0    3.4 0.83   4.6
11. 140 NB TRL                        *  235983.98    848285.06   235965.06    848337.00 *      55.   340. AG
697.   8.5   0.0    9.0
12. 140 NB TRL QUEUE                  *  235965.06    848337.00   236442.47    847026.62 *    1395.   160. AG
98. 100.0   0.0    3.0 2.43 232.4
13. 140 SB LL                         *  235919.00    848421.94   235949.36    848359.12 *      70.   154. AG
107.   8.5   0.0    9.4
14. 140 SB LL QUEUE                   *  235949.36    848359.12   235907.05    848446.69 *      97.   334. AG
111. 100.0   0.0    3.4 1.24  16.2
15. 140 SB TR                         *  235919.53    848419.00   235945.62    848359.38 *      65.   156. AG
485.   8.5   0.0    9.4
16. 140 SB TR QUEUE                   *  235945.62    848359.38   235571.19    849215.00 *     934.   336. AG
103. 100.0   0.0    3.4 2.26 155.7
17. Hart EB OUTBOUND                  *  235965.73    848350.19   236039.41    848363.12 *      75.    80. AG
374.   8.5   0.0    9.4
18. Hart WB OUTBOUND                  *  235941.72    848352.06   235869.94    848338.81 *      73.   260. AG
270.   8.5   0.0    9.4
19. 140 NB OUTBOUND                   *  235952.52    848359.88   235923.64    848423.31 *      70.   336. AG
763.   8.5   0.0    9.4
20. 140 SB OUTBOUND                   *  235956.02    848338.31   235978.42    848283.25 *      59.   158. AG
848.   8.5   0.0    9.4
21. EBL                               *  235946.53    848348.12   235953.55    848359.31 *      13.    32. AG
38.   9.4   0.0    9.0
22. EBT                               *  235946.27    848348.31   235965.38    848350.44 *      19.    84. AG
192.   8.5   0.0    9.0
23. EBR                               *  235944.44    848346.44   235956.19    848338.50 *      14.   124. AG
```

277. 10.3 0.0 9.0
24. WBL * 235969.30 848354.88 235956.00 848339.56 * 20. 221. AG
99. 9.4 0.0 9.0
25. WBT * 235969.11 848354.62 235942.53 848351.69 * 27. 264. AG
126. 8.5 0.0 9.0
26. WBR * 235967.92 848357.19 235952.72 848359.31 * 15. 278. AG
103. 10.3 0.0 9.0
27. NBL * 235962.92 848337.50 235942.34 848352.00 * 25. 305. AG
131. 9.4 0.0 9.0
28. NBT * 235964.83 848337.69 235952.81 848359.44 * 25. 331. AG
622. 8.5 0.0 9.0
29. NBR * 235964.45 848338.56 235967.66 848350.31 * 12. 15. AG
75. 10.3 0.0 9.0
30. SBL * 235949.27 848359.25 235965.19 848350.25 * 18. 119. AG
107. 9.4 0.0 9.0
31. SBT * 235945.70 848359.44 235956.09 848338.94 * 23. 153. AG
472. 8.5 0.0 9.0
32. SBR * 235946.34 848359.62 235939.53 848350.81 * 11. 218. AG
13. 10.3 0.0 9.0

FF

JOB: First Light - Taunton - Hart & County Sts- 2022 Build A AM RUN: CAL3QHC
RUN

DATE : 12/11/12
TIME : 11:29:26

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Hart EB TL QUEUE	*	132	101	5.0	230	1900	45.89	2	3
4. Hart EB RL QUEUE	*	132	78	5.0	277	1900	45.89	2	3
6. Hart WB LT QUEUE	*	132	101	5.0	225	1900	45.89	2	3
8. Hart WB RL QUEUE	*	132	82	5.0	103	1900	45.89	2	3
10. 140 NB L QUEUE	*	132	114	5.0	131	1900	45.89	2	3

12. 140 NB TRL QUEUE	*	132	105	5.0	697	1900	45.89	2	3
14. 140 SB LL QUEUE	*	132	119	5.0	107	1900	45.89	2	3
16. 140 SB TR QUEUE	*	132	110	5.0	485	1900	45.89	2	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235961.95	848360.62	1.8	*
2. LR_2	*	235956.00	848363.88	1.8	*
3. LR_3	*	235953.88	848368.38	1.8	*
4. LR_4	*	235951.77	848372.94	1.8	*
5. LR_5	*	235949.66	848377.50	1.8	*
6. LR_6	*	235947.55	848382.00	1.8	*
7. LR_7	*	235945.42	848386.50	1.8	*
8. LR_8	*	235943.31	848391.06	1.8	*
9. LR_9	*	235941.19	848395.56	1.8	*
10. LR_10	*	235939.06	848400.12	1.8	*
11. LR_11	*	235936.95	848404.62	1.8	*
12. LR_12	*	235934.84	848409.19	1.8	*
13. LR_13	*	235932.73	848413.69	1.8	*
14. LR_14	*	235930.61	848418.25	1.8	*
15. LR_15	*	235928.50	848422.75	1.8	*
16. LR_16	*	235913.59	848419.25	1.8	*
17. LR_17	*	235915.72	848414.69	1.8	*
18. LR_18	*	235917.83	848410.19	1.8	*
19. LR_19	*	235919.95	848405.62	1.8	*
20. LR_20	*	235922.06	848401.12	1.8	*
21. LR_21	*	235924.19	848396.56	1.8	*
22. LR_22	*	235926.30	848392.06	1.8	*
23. LR_23	*	235928.41	848387.50	1.8	*
24. LR_24	*	235930.52	848383.00	1.8	*
25. LR_25	*	235932.64	848378.50	1.8	*
26. LR_26	*	235934.75	848373.94	1.8	*
27. LR_27	*	235936.88	848369.44	1.8	*
28. LR_28	*	235938.98	848364.88	1.8	*
29. LR_29	*	235941.09	848360.31	1.8	*
30. LR_31	*	235969.44	848342.38	1.8	*
31. LR_32	*	235970.98	848345.12	1.8	*

32. LR_33	*	235975.58	848347.31	1.8 *
33. LR_34	*	235980.50	848348.19	1.8 *
34. LR_35	*	235985.42	848349.12	1.8 *
35. LR_36	*	235990.34	848350.00	1.8 *
36. LR_37	*	235995.27	848350.94	1.8 *

FF

JOB: First Light - Taunton - Hart & County Sts- 2022 Build A AM RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
37. LR_38	*	236000.19	848351.81	1.8 *
38. LR_39	*	236005.09	848352.69	1.8 *
39. LR_40	*	236010.02	848353.62	1.8 *
40. LR_41	*	236014.94	848354.50	1.8 *
41. LR_42	*	236019.84	848355.38	1.8 *
42. LR_43	*	236024.77	848356.31	1.8 *
43. LR_44	*	236029.69	848357.19	1.8 *
44. LR_45	*	236034.61	848358.12	1.8 *
45. LR_46	*	236039.53	848359.00	1.8 *
46. LR_47	*	236041.47	848373.19	1.8 *
47. LR_48	*	236036.55	848372.31	1.8 *
48. LR_49	*	236031.62	848371.44	1.8 *
49. LR_50	*	236026.70	848370.50	1.8 *
50. LR_51	*	236021.80	848369.62	1.8 *
51. LR_52	*	236016.88	848368.69	1.8 *
52. LR_53	*	236011.95	848367.81	1.8 *
53. LR_54	*	236007.05	848366.94	1.8 *
54. LR_55	*	236002.12	848366.00	1.8 *
55. LR_56	*	235997.20	848365.12	1.8 *
56. LR_57	*	235992.28	848364.25	1.8 *
57. LR_58	*	235987.38	848363.31	1.8 *
58. LR_59	*	235982.45	848362.44	1.8 *
59. LR_60	*	235977.53	848361.50	1.8 *
60. LR_61	*	235972.61	848360.62	1.8 *
61. LR_62	*	235967.69	848359.75	1.8 *
62. LR_64	*	235938.45	848355.44	1.8 *
63. LR_65	*	235933.53	848354.56	1.8 *
64. LR_66	*	235928.59	848353.69	1.8 *

65. LR_67	*	235923.69	848352.88	1.8 *
66. LR_68	*	235918.75	848352.00	1.8 *
67. LR_69	*	235913.83	848351.12	1.8 *
68. LR_70	*	235908.91	848350.25	1.8 *
69. LR_71	*	235903.97	848349.44	1.8 *
70. LR_72	*	235899.05	848348.56	1.8 *
71. LR_73	*	235894.12	848347.69	1.8 *
72. LR_74	*	235889.20	848346.88	1.8 *
73. LR_75	*	235884.27	848346.00	1.8 *
74. LR_76	*	235879.34	848345.12	1.8 *
75. LR_77	*	235874.42	848344.25	1.8 *
76. LR_78	*	235869.48	848343.44	1.8 *
77. LR_79	*	235871.02	848332.75	1.8 *
78. LR_80	*	235875.95	848333.56	1.8 *
79. LR_81	*	235880.88	848334.44	1.8 *
80. LR_82	*	235885.80	848335.31	1.8 *
81. LR_83	*	235890.73	848336.12	1.8 *
82. LR_84	*	235895.66	848337.00	1.8 *
83. LR_85	*	235900.58	848337.88	1.8 *
84. LR_86	*	235905.50	848338.75	1.8 *
85. LR_87	*	235910.44	848339.56	1.8 *
86. LR_88	*	235915.36	848340.44	1.8 *
87. LR_89	*	235920.28	848341.31	1.8 *
88. LR_90	*	235925.38	848341.50	1.8 *
89. LR_91	*	235930.12	848341.56	1.8 *
90. LR_92	*	235935.22	848341.44	1.8 *
91. LR_93	*	235940.47	848342.31	1.8 *
92. LR_94	*	235945.70	848340.75	1.8 *
93. LR_96	*	235948.52	848339.25	1.8 *

FF

JOB: First Light - Taunton - Hart & County Sts- 2022 Build A AM RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
94. LR_97	*	235952.20	848335.62	1.8 *
95. LR_98	*	235954.11	848331.00	1.8 *
96. LR_99	*	235956.02	848326.38	1.8 *
97. LR_100	*	235957.94	848321.75	1.8 *

98.	LR_101	*	235959.84	848317.12	1.8 *
99.	LR_102	*	235961.77	848312.50	1.8 *
**.	LR_103	*	235963.67	848307.88	1.8 *
**.	LR_104	*	235965.58	848303.25	1.8 *
**.	LR_105	*	235967.50	848298.69	1.8 *
**.	LR_106	*	235969.41	848294.06	1.8 *
**.	LR_107	*	235971.31	848289.44	1.8 *
**.	LR_108	*	235973.23	848284.81	1.8 *
**.	LR_109	*	235988.36	848288.12	1.8 *
**.	LR_110	*	235986.45	848292.75	1.8 *
**.	LR_111	*	235984.55	848297.38	1.8 *
**.	LR_112	*	235982.62	848302.00	1.8 *
**.	LR_113	*	235980.70	848306.62	1.8 *
**.	LR_114	*	235978.80	848311.25	1.8 *
**.	LR_115	*	235976.89	848315.88	1.8 *
**.	LR_116	*	235974.98	848320.50	1.8 *
**.	LR_117	*	235973.06	848325.12	1.8 *
**.	LR_118	*	235971.16	848329.75	1.8 *
**.	LR_119	*	235969.23	848334.38	1.8 *
**.	LR_120	*	235967.33	848339.00	1.8 *

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	* 0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.7	0.7	0.8	0.9	1.

```
 10.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.6    0.8    0.9    0.9
 20.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.6    0.8    0.9     1.
 30.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.7    0.8    0.9     1.
 40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.8    0.8    0.9    0.9
 50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.5
 0.8    0.8    0.8    0.8
 60.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.5
 0.6    0.8    0.8    0.8
 70.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.7    0.8    0.8    0.8
 80.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
 0.9    0.9    0.8    0.8
 90.  *    0.5    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.7
 0.9    0.9    0.9    0.9
100.  *    0.6    0.3    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.9
0.9    0.9    0.9    0.9
110.  *    0.5    0.3    0.3    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.9
1.     1.     1.     1.
120.  *    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.9
1.     1.     1.     1.

------*-----------------------------------------------------------------------------------------------------------------
---------------------
MAX   *    0.6    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.9
1.     1.     1.     1.
DEGR. *    100    100    110    120    110      0      0      0      0      0      0      0      0      0      0    100
110    110    110      0
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
130.	*	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	1.	1.	1.	1.	1.
140.	*	0.1	0.2	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.	1.	1.1	1.1	1.1
150.	*	0.3	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.9	0.9	0.9	0.9	0.9
160.	*	0.7	0.8	0.7	0.8	0.8	0.8	0.9	0.7	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.5	0.4	0.4	0.4	0.4
170.	*	0.6	0.7	0.8	0.8	0.7	0.7	0.7	0.9	0.9	0.9	0.9	1.	1.	1.	1.	0.2	0.1	0.1	0.1	0.1
180.	*	0.5	0.5	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.9	1.	1.	1.	1.	0.	0.	0.	0.	0.
190.	*	0.4	0.5	0.4	0.4	0.9	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
200.	*	0.4	0.3	0.6	0.8	0.9	1.	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.	0.	0.	0.	0.
210.	*	0.3	0.4	0.6	0.8	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.	0.	0.	0.	0.
220.	*	0.2	0.5	0.8	0.8	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.	0.	0.	0.	0.
230.	*	0.4	0.6	0.8	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.	0.	0.	0.	0.
240.	*	0.4	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.	0.	0.	0.	0.
250.	*	0.5	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.	0.	0.	0.	0.
260.	*	0.5	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.	0.	0.	0.	0.
270.	*	0.4	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.	0.	0.	0.	0.

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 280.  *    0.5    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.5     0.
 0.     0.     0.     0.
 290.  *    0.6    0.9    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.6    0.5     0.
 0.     0.     0.     0.
 300.  *    0.7    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.7    0.6    0.5     0.
 0.     0.     0.     0.
 310.  *    0.7    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.6    0.6    0.5     0.
 0.     0.     0.     0.
 320.  *    0.7    1.1    1.1    1.1    1.1    1.1    1.1    0.9    0.9    0.9    0.8    0.8    0.7    0.7    0.5    0.1
 0.1    0.1    0.1    0.1
 330.  *    0.5     1.    0.9    0.9    0.9    0.9    0.8    0.8    0.8    0.7    0.7    0.6    0.6    0.5    0.5    0.3
 0.3    0.3    0.4    0.5
 340.  *    0.3    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.3    0.3    0.2    0.5
 0.6    0.7    0.7    0.7
 350.  *     0.    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.6
 0.7    0.8    0.8    0.9
 360.  *     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.    0.7
 0.7    0.8    0.9     1.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.7    1.1    1.1    1.1    1.1    1.1    1.1    0.9    0.9    0.9    0.9     1.     1.     1.     1.     1.
 1.    1.1    1.1    1.1
 DEGR. *    160    320    320    320    320    320    320    170    170    170    170    170    170    170    170    130
 110    140    140    140
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36

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 REC37  REC38  REC39  REC40

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *     1.     1.    1.1    1.1    1.1    1.1    1.1    1.1    1.2    0.3    0.3    0.5    0.5    0.4    0.4    0.4
   0.4    0.4    0.2    0.2
  10.  *     1.     1.    1.1    1.1    1.1    1.1    1.1    1.1    1.1    0.3    0.3    0.5    0.5    0.4    0.4    0.4
  0.4    0.3    0.2    0.2
  20.  *     1.     1.     1.     1.     1.     1.     1.    1.1    1.1    0.3    0.4    0.5    0.4    0.4    0.4    0.4
  0.4    0.3    0.2    0.2
  30.  *     1.     1.     1.     1.     1.     1.     1.    0.9    0.9    0.4    0.5    0.5    0.4    0.4    0.4    0.4
  0.3    0.2    0.2    0.2
  40.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.9    0.3    0.5    0.4    0.4    0.4    0.4    0.4
  0.3    0.2    0.2    0.2
  50.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.4    0.4    0.5    0.5    0.5    0.5    0.4
  0.4    0.3    0.3    0.3
  60.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.3    0.5    0.5    0.5    0.4    0.4    0.4
  0.3    0.3    0.3    0.3
  70.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.2    0.4    0.4    0.4    0.4    0.4    0.3
  0.2    0.2    0.2    0.1
  80.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.1    0.1    0.3    0.2    0.2    0.1    0.1
  0.1    0.1    0.1    0.1
  90.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8     1.     0.     0.    0.1    0.1    0.1    0.1    0.1
  0.1    0.1    0.1    0.1
 100.  *     1.     1.     1.     1.     1.    1.1    0.9    0.9    0.9     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 110.  *     1.     1.     1.    1.1    1.1    1.1    0.9    0.9    0.5     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 120.  *     1.     1.     1.     1.     1.    0.9    0.9    0.8    0.4     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 130.  *     1.     1.     1.     1.    0.8    0.9     1.    0.7    0.7     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 140.  *     1.     1.    0.9    0.9     1.    1.2    1.1    0.8    0.7     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 150.  *     1.    0.9    0.8    0.8     1.    1.1    0.8    0.8    0.6    0.2    0.1    0.1    0.1     0.     0.     0.
 0.     0.     0.     0.
 160.  *    0.4    0.4    0.5    0.4    0.4    0.6    0.7    0.6    0.5    0.6    0.4    0.2    0.2    0.1    0.1    0.1
 0.1    0.1    0.1    0.1
 170.  *    0.2    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.5    0.8    0.7    0.3    0.2    0.2    0.1    0.1
 0.1    0.1    0.1    0.1
```

```
180.  *    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.9    0.7    0.5    0.4    0.2    0.1    0.1
0.1    0.1    0.1    0.1
190.  *     0.    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.9    0.8    0.5    0.4    0.3    0.2    0.1
0.1    0.1    0.1    0.1
200.  *     0.     0.     0.    0.1    0.2    0.2    0.2    0.3    0.3    0.8    0.7    0.5    0.4    0.4    0.3    0.3
0.2    0.1    0.1    0.1
210.  *     0.     0.     0.     0.    0.1    0.2    0.2    0.3    0.4    0.7    0.5    0.4    0.4    0.4    0.4    0.3
0.3    0.3    0.1    0.1
220.  *     0.     0.     0.     0.     0.    0.1    0.2    0.3    0.4    0.7    0.5    0.4    0.4    0.4    0.4    0.4
0.4    0.3    0.3    0.2
230.  *     0.     0.     0.     0.     0.     0.     0.    0.3    0.4    0.5    0.3    0.4    0.4    0.4    0.4    0.4
0.4    0.4    0.3    0.2
240.  *     0.     0.     0.     0.     0.     0.     0.    0.1    0.3    0.3    0.2    0.2    0.2    0.2    0.3    0.3
0.3    0.3    0.2    0.1
250.  *     0.     0.     0.     0.     0.     0.     0.     0.    0.2    0.2    0.2    0.1    0.1    0.2    0.1    0.1
0.1    0.1    0.1    0.1
260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.4    0.5    0.4    0.3    0.3    0.2
0.1    0.2    0.2    0.3
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.4    0.5    0.4    0.3    0.4    0.4
0.3    0.3    0.3    0.5
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.5    0.4    0.3    0.3    0.3    0.4
0.6    0.6    0.5    0.5
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.4    0.2    0.4    0.5    0.5    0.8    0.9
0.9    0.8    0.8    0.8
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.4    0.5    0.5    0.8    0.8    0.8
0.7    0.7    0.7    0.6
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.6    0.6    0.5    0.7    0.8    0.8    0.8
0.7    0.6    0.6    0.4
320.  *    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.7    0.8    0.6    0.8    0.8    0.7    0.6
0.5    0.5    0.5    0.4
330.  *    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.6    0.6    0.7    0.5    0.7    0.6    0.6    0.5    0.5
0.5    0.5    0.4    0.3
340.  *    0.7    0.8    0.9     1.     1.     1.    1.1    1.1    1.2    0.4    0.4    0.5    0.6    0.6    0.5    0.4
0.4    0.4    0.3    0.2
350.  *     1.    1.1    1.1    1.1    1.1    1.1    1.3    1.3    1.3    0.1    0.3    0.5    0.5    0.5    0.4    0.4
0.4    0.4    0.3    0.2
360.  *     1.     1.    1.1    1.1    1.1    1.1    1.1    1.1    1.2    0.3    0.3    0.5    0.5    0.4    0.4    0.4
0.4    0.4    0.2    0.2

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```

```
 ---------------------
 MAX   *     1.    1.1    1.1    1.1    1.1    1.2    1.3    1.3    1.3    0.9    0.8    0.7    0.8    0.8    0.8    0.9
 0.9    0.8    0.8    0.8
 DEGR. *      0    350      0      0      0    140    350    350    350    180    190    330    320    300    290    290
 290    290    290    290
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC41  REC42  REC43  REC44  REC45  REC46  REC47  REC48  REC49  REC50  REC51  REC52  REC53  REC54  REC55  REC56
 REC57  REC58  REC59  REC60

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 ---------------------
    .  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
   0.     0.     0.     0.
  10.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  20.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  30.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  40.  *    0.2    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  50.  *    0.2    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  60.  *    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  70.  *    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.    0.1
```

```
 80.  *    0.1    0.1    0.1    0.1    0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1
 0.2    0.3    0.3    0.4
 90.  *    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.2    0.2    0.3
 0.4    0.5    0.6    0.7
100.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.2    0.2    0.2    0.2    0.3    0.4
0.5    0.5    0.8    0.9
110.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.2    0.3    0.4
0.4    0.5    0.7    0.8
120.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.3    0.4    0.4
0.5    0.5    0.8    0.8
130.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.2    0.3    0.4    0.4
0.4    0.4    0.7    0.7
140.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.2    0.4    0.4    0.4
0.4    0.4    0.7    0.7
150.  *     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.2    0.2    0.4    0.4    0.4
0.4    0.4    0.6    0.8
160.  *    0.1    0.1     0.     0.     0.     0.     0.     0.2    0.2    0.3    0.3    0.3    0.3    0.5    0.5    0.5
0.5    0.6    0.7    0.9
170.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.5    0.5    0.5
0.5    0.7    0.9    1.1
180.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.5    0.5    0.5
0.5    0.8    1.1    1.2
190.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.3    0.3    0.5    0.5    0.5    0.6
0.7     1.    1.1    0.9
200.  *    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.3    0.3    0.3    0.3    0.4    0.5    0.5    0.7    0.7
0.8     1.    1.1     1.
210.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.3    0.4    0.6    0.8    0.8    0.8
0.8    1.1    0.9    0.7
220.  *    0.1    0.1    0.1    0.1     0.    0.2    0.2    0.2    0.3    0.3    0.4    0.6    0.7    0.8    0.8    0.8
0.8    0.8    0.9    0.3
230.  *    0.2    0.1    0.1     0.     0.    0.2    0.2    0.2    0.2    0.3    0.3    0.4    0.5    0.5    0.5    0.6
0.5    0.8    0.6    0.3
240.  *     0.     0.     0.    0.1    0.1    0.2    0.3    0.3    0.3    0.3    0.5    0.5    0.5    0.5    0.5    0.5
0.7    0.6    0.6    0.6
250.  *    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.4    0.5    0.5    0.5    0.6    0.5    0.4
0.6    0.5    0.5    0.5
260.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2
0.2    0.2    0.3    0.2
270.  *    0.5    0.4    0.4    0.4    0.4     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.1    0.1    0.3
0.4    0.4    0.4    0.3
```

```
 280.  *    0.5    0.4    0.4    0.4    0.4     0.    0.1    0.1    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.3
 0.3    0.3    0.3    0.3
 290.  *    0.6    0.6    0.6    0.5    0.5    0.1    0.1    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.3
 0.3    0.3    0.4    0.4
 300.  *    0.5    0.4    0.4    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.3    0.3    0.3
 0.3    0.3    0.4    0.4
 310.  *    0.3    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2
 0.3    0.3    0.3    0.4
 320.  *    0.3    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.2    0.3    0.4
 330.  *    0.3    0.3    0.3    0.3    0.3     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.1    0.1    0.3
 340.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.1    0.1    0.1    0.1
 350.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 360.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.6    0.6    0.6    0.5    0.5    0.3    0.3    0.3    0.3    0.4    0.5    0.6    0.7    0.8    0.8    0.8
 0.8    1.1    1.1    1.2
 DEGR. *    290    290    290    290    290    250    170    170    170    250    240    220    220    210    210    210
 200    210    180    180
```

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC61	REC62	REC63	REC64	REC65	REC66	REC67	REC68	REC69	REC70	REC71	REC72	REC73	REC74	REC75	REC76

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 REC77  REC78  REC79  REC80

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *     0.    0.8    0.6    0.5    0.5    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
   0.1    0.3    0.3    0.3
 10.  *     0.    0.8    0.6    0.5    0.4    0.4    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1
 0.3    0.3    0.3    0.3
 20.  *     0.    0.6    0.6    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1
 0.3    0.3    0.3    0.4
 30.  *     0.    0.6    0.6    0.4    0.4    0.4    0.4    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1
 0.4    0.4    0.4    0.4
 40.  *     0.    0.6    0.5    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.2
 0.4    0.4    0.4    0.4
 50.  *     0.    0.5    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.2
 0.3    0.4    0.4    0.4
 60.  *     0.    0.5    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.1
 0.2    0.2    0.2    0.3
 70.  *    0.1    0.4    0.3    0.3    0.4    0.4    0.3    0.3    0.3    0.2    0.2    0.1    0.1    0.1    0.1    0.1
 0.3    0.3    0.4    0.4
 80.  *    0.6    0.4    0.4    0.2    0.2    0.1    0.1    0.2    0.2    0.3    0.3    0.3    0.3    0.2    0.2    0.2
 0.3    0.4    0.4    0.4
 90.  *    0.8    0.4    0.5    0.4    0.4    0.2    0.3    0.3    0.4    0.6    0.4    0.4    0.4    0.4    0.4    0.3
 0.1    0.2    0.2    0.3
100.  *    0.9    0.4    0.3    0.4    0.5    0.4    0.6    0.6    0.7    0.6    0.5    0.4    0.4    0.4    0.3    0.3
0.1    0.1    0.1    0.1
110.  *    0.8    0.2    0.4    0.5    0.6    0.6    0.7    0.8    0.9    0.8    0.5    0.4    0.3    0.2    0.2    0.2
0.     0.    0.1    0.1
120.  *    0.8    0.3    0.8    0.9     1.     1.    0.9    0.9    0.9    0.6    0.5    0.3    0.3    0.3    0.3    0.3
0.1    0.1    0.1    0.1
130.  *    0.6    0.8    0.8     1.     1.    0.9    0.9    0.9    0.6    0.4    0.3    0.3    0.3    0.3    0.3    0.3
0.1    0.1    0.1    0.1
140.  *    0.5    0.9     1.    0.9    0.8    0.8    0.7    0.8    0.5    0.3    0.3    0.3    0.3    0.3    0.3    0.3
0.1    0.1    0.1    0.1
150.  *    0.4    0.9    0.9    0.8    0.7    0.7    0.7    0.7    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.3
0.1    0.1    0.1    0.1
160.  *    0.6    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.4    0.3    0.3    0.2    0.2    0.2    0.2    0.1
0.     0.     0.     0.
170.  *    0.6    0.7    0.6    0.6    0.6    0.6    0.6    0.5    0.2    0.2    0.2    0.2    0.2    0.2    0.2     0.
0.     0.     0.     0.
```

```
180.  *    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.
0.     0.     0.     0.
190.  *    0.5    0.6    0.6    0.6    0.6    0.6    0.6    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.
0.     0.     0.     0.
200.  *    0.3    0.6    0.6    0.6    0.6    0.6    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.
0.     0.     0.     0.
210.  *    0.2    0.6    0.6    0.6    0.6    0.6    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.
0.     0.     0.     0.
220.  *    0.2    0.6    0.6    0.6    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.
0.     0.     0.     0.
230.  *    0.2    0.6    0.6    0.6    0.4    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.     0.
0.     0.     0.     0.
240.  *    0.4    0.6    0.5    0.4    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.     0.
0.     0.     0.     0.
250.  *    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.
0.     0.     0.    0.1
260.  *    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.     0.
0.     0.    0.1    0.1
270.  *    0.4    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.
0.     0.    0.1    0.1
280.  *    0.4     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.    0.1    0.2
290.  *    0.5     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.1    0.2    0.2
300.  *    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.1    0.2    0.2
310.  *    0.7     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.1    0.2    0.2
320.  *    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.2    0.2    0.2
330.  *    0.4    0.3    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.2    0.2    0.2
340.  *    0.1    0.7    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.
0.    0.3    0.3    0.3
350.  *     0.    0.7    0.6    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
0.1    0.3    0.3    0.3
360.  *     0.    0.8    0.6    0.5    0.5    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
0.1    0.3    0.3    0.3

------*-----------------------------------------------------------------------------------------------------------
```

```
 ---------------------
 MAX   *    0.9    0.9     1.     1.     1.     1.    0.9    0.9    0.9    0.8    0.5    0.4    0.4    0.4    0.4    0.3
 0.4    0.4    0.4    0.4
 DEGR. *    100    140    140    130    120    120    120    120    110    110    100     90     90     90     90     90
 30     30     30     20
FF                                                                                                          PAGE    9

       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC81  REC82  REC83  REC84  REC85  REC86  REC87  REC88  REC89  REC90  REC91  REC92  REC93  REC94  REC95  REC96
 REC97  REC98  REC99  REC100

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.3    0.3    0.3    0.3    0.9     1.     1.    1.1    1.3    1.3    1.2     1.    0.7    0.7    0.8    0.6
   0.5    0.5    0.8    0.7
  10.  *    0.3    0.4    0.4    0.4     1.    1.1    1.2    1.2    1.2    1.2    1.1    0.6    0.5    0.4    0.5    0.4
  0.5    0.7    0.7    0.7
  20.  *    0.4    0.4    0.4    0.5    1.1    1.1    1.2    1.2    1.2     1.     1.    0.5    0.3    0.4    0.4    0.4
  0.7    0.7    0.8    0.9
  30.  *    0.4    0.4    0.5    0.7    1.2    1.2    1.4    1.3    1.2    0.9    0.9    0.3    0.3    0.4    0.3    0.6
  0.8    0.8    0.9    0.9
  40.  *    0.4    0.4    0.5    0.8    1.2    1.3    1.3    1.3    1.2     1.    0.8    0.3    0.3    0.5    0.4    0.7
  0.7    0.7    0.7    0.8
  50.  *    0.4    0.5    0.6    1.1    1.3    1.4    1.4    1.1    0.9    0.8    0.7    0.3    0.4    0.6    0.6    0.8
  0.7    0.6    0.6    0.6
  60.  *    0.4    0.4    0.5    0.9    1.1    1.1    1.2     1.    0.9    0.8    0.8    0.5    0.5    0.5    0.8    0.6
  0.6    0.6    0.6    0.5
  70.  *    0.4    0.5    0.8    0.9    1.1    1.1    1.1     1.     1.    0.9    0.7    0.5    0.5    0.5    0.6    0.7
  0.7    0.7    0.7    0.6
```

```
 80.  *    0.4    0.6    0.6    0.7    0.7    0.7    0.8    0.8    0.8    0.7    0.7    0.5    0.5    0.6    0.6    0.6
 0.6    0.6    0.6    0.5
 90.  *    0.3    0.3    0.3    0.5    0.5    0.5    0.6    0.4    0.2    0.4    0.4    0.3    0.4    0.5    0.6    0.6
 0.6    0.6    0.6    0.5
100.  *    0.1    0.1    0.2    0.3    0.4    0.5    0.5    0.4    0.3    0.3    0.5    0.6    0.7    0.7    0.7    0.8
0.8    0.8    0.7    0.6
110.  *    0.1    0.2    0.2    0.2    0.2    0.4    0.5    0.4    0.4    0.4    0.5    0.5    0.6    0.8    0.8    0.8
0.8    0.7    0.6    0.6
120.  *    0.1    0.1    0.1    0.2    0.2    0.2    0.3    0.4    0.4    0.4    0.4    0.6    0.7    0.8    0.8    0.8
0.8    0.8    0.6    0.6
130.  *    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.3    0.3    0.4    0.5    0.7    0.9     1.     1.    0.8
0.8    0.7    0.7    0.7
140.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.3    0.6    0.6    0.7    0.8    0.8    0.8
0.7    0.7    0.7    0.7
150.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.5    0.7    0.8    0.8    0.7
0.7    0.8    0.8    0.6
160.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.4    0.5    0.5    0.5
0.5    0.5    0.5    0.5
170.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.3    0.3
0.3    0.3    0.2    0.2
180.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1
0.1    0.1    0.1    0.1
190.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
200.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
210.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
240.  *     0.     0.     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
250.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.2    0.1    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
260.  *    0.1    0.1    0.1    0.1    0.1    0.3    0.6    0.4    0.4    0.4    0.4    0.3     0.     0.     0.     0.
0.     0.     0.     0.
270.  *    0.2    0.2    0.2    0.2    0.2    0.4    0.8    0.8    0.7    0.7    0.7    0.4    0.4    0.1     0.     0.
0.     0.     0.     0.
```

```
 280.  *    0.2    0.2    0.2    0.2    0.2    0.6    0.9    0.9    0.9    0.9    0.9    0.7    0.7    0.2    0.1     0.
 0.     0.     0.     0.
 290.  *    0.2    0.2    0.2    0.2    0.3    0.7     1.     1.    0.9    0.9    0.9    0.7    0.7    0.4    0.2    0.2
 0.     0.     0.     0.
 300.  *    0.2    0.2    0.2    0.2    0.3    0.9     1.     1.    0.9    0.9    0.9    0.7    0.8    0.4    0.2    0.2
 0.2    0.1     0.     0.
 310.  *    0.2    0.2    0.2    0.2    0.4    0.9     1.    0.9    0.9    0.9    0.9    0.7    0.7    0.3    0.2    0.2
 0.2    0.2    0.2    0.2
 320.  *    0.2    0.2    0.2    0.2    0.4    0.8    0.9    0.9    0.9    0.8    0.9    0.6    0.6    0.4    0.3    0.4
 0.4    0.4    0.2    0.2
 330.  *    0.2    0.2    0.2    0.2    0.5    0.8    0.9    0.9    0.9    0.8    0.8     1.    0.7    0.9    0.9    0.5
 0.5    0.6    0.5    0.4
 340.  *    0.3    0.3    0.3    0.3    0.7    0.9    0.9    0.9     1.     1.    1.1    1.4    1.1    0.9     1.     1.
 0.8    0.8    0.7    0.7
 350.  *    0.3    0.3    0.3    0.3    0.7    0.9     1.    1.1    1.1    1.2    1.4    1.3    0.9    0.9     1.    0.7
 0.8    0.8    0.8    0.9
 360.  *    0.3    0.3    0.3    0.3    0.9     1.     1.    1.1    1.3    1.3    1.2     1.    0.7    0.7    0.8    0.6
 0.5    0.5    0.8    0.7

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.4    0.6    0.8    1.1    1.3    1.4    1.4    1.3    1.3    1.3    1.4    1.4    1.1     1.     1.     1.
 0.8    0.8    0.9    0.9
 DEGR. *     20     80     70     50     50     50     30     30      0      0    350    340    340    130    130    340
 30     30     30     20
```

FF PAGE 10

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC101	REC102	REC103	REC104	REC105	REC106	REC107	REC108	REC109	REC110	REC111	REC112	REC113	REC114	REC115	REC116

REC117

.	*	0.8	0.8	0.8	0.9	0.9	0.	0.	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2
10.	*	0.9	1.	0.9	0.9	0.8	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3
20.	*	1.	0.8	0.8	0.7	0.7	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.2	0.3	0.3
30.	*	0.8	0.7	0.7	0.7	0.7	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.2	0.2	0.3
40.	*	0.7	0.6	0.6	0.6	0.7	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.2
50.	*	0.5	0.4	0.5	0.5	0.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.2
60.	*	0.4	0.5	0.5	0.5	0.6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2
70.	*	0.6	0.6	0.6	0.6	0.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
80.	*	0.4	0.5	0.5	0.5	0.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90.	*	0.5	0.5	0.5	0.5	0.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100.	*	0.6	0.6	0.6	0.6	0.4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
110.	*	0.6	0.6	0.6	0.5	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
120.	*	0.6	0.6	0.6	0.5	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
130.	*	0.6	0.6	0.6	0.4	0.3	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1
140.	*	0.6	0.6	0.5	0.4	0.3	0.	0.	0.	0.	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
150.	*	0.6	0.6	0.5	0.5	0.4	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.6	0.6
160.	*	0.4	0.4	0.4	0.3	0.3	0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.9	1.	1.1	1.
170.	*	0.2	0.2	0.2	0.2	0.1	0.4	0.5	0.6	0.6	0.8	0.9	0.9	0.9	1.2	1.2	1.4	1.5
180.	*	0.1	0.1	0.1	0.	0.	0.4	0.5	0.6	0.7	0.8	0.8	0.8	1.1	1.3	1.3	1.5	1.4
190.	*	0.	0.	0.	0.	0.	0.3	0.4	0.6	0.7	0.7	0.9	0.9	1.	1.2	1.3	1.3	1.3
200.	*	0.	0.	0.	0.	0.	0.3	0.5	0.6	0.6	0.8	0.8	0.8	1.	1.2	1.2	1.2	1.
210.	*	0.	0.	0.	0.	0.	0.3	0.6	0.6	0.7	0.7	0.7	0.8	0.9	1.	1.	1.	1.
220.	*	0.	0.	0.	0.	0.	0.3	0.5	0.7	0.7	0.7	0.7	0.8	0.9	1.	1.	1.	0.8
230.	*	0.	0.	0.	0.	0.	0.3	0.5	0.6	0.7	0.7	0.7	0.9	1.	1.	1.	1.	0.7
240.	*	0.	0.	0.	0.	0.	0.4	0.6	0.6	0.7	0.7	0.7	0.9	0.9	1.	1.	1.	0.7
250.	*	0.	0.	0.	0.	0.	0.5	0.6	0.6	0.6	0.7	0.7	0.9	0.9	1.	1.	1.	0.3
260.	*	0.	0.	0.	0.	0.	0.5	0.6	0.6	0.7	0.7	0.8	0.9	1.	1.	1.	1.	0.2
270.	*	0.	0.	0.	0.	0.	0.6	0.6	0.6	0.7	0.7	0.8	0.9	1.	1.	1.	0.9	0.5
280.	*	0.	0.	0.	0.	0.	0.6	0.6	0.7	0.7	0.7	0.9	1.	1.	1.	1.2	1.	0.6
290.	*	0.	0.	0.	0.	0.	0.7	0.7	0.7	0.7	0.8	0.9	1.	1.1	1.2	1.1	1.2	0.6
300.	*	0.	0.	0.	0.	0.	0.7	0.8	0.8	0.9	1.	1.2	1.2	1.2	1.3	1.1	0.9	0.4
310.	*	0.1	0.1	0.1	0.1	0.1	0.8	0.9	0.9	0.9	1.	1.2	1.2	1.1	1.1	1.2	0.8	0.6
320.	*	0.2	0.1	0.1	0.1	0.1	1.	1.	1.	1.2	1.1	1.2	1.1	1.3	1.4	1.1	1.	1.
330.	*	0.4	0.4	0.4	0.4	0.5	1.	1.	1.	1.3	1.3	1.4	1.4	1.1	1.	0.9	0.9	0.9
340.	*	0.7	0.8	0.9	0.7	0.9	0.8	0.8	0.7	0.7	0.8	0.8	0.9	0.8	0.7	0.8	0.6	0.6
350.	*	1.	0.9	0.9	0.9	0.8	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.1
360.	*	0.8	0.8	0.8	0.9	0.9	0.	0.	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2

MAX	*	1.	1.	0.9	0.9	0.9	1.	1.	1.	1.3	1.3	1.4	1.4	1.3	1.4	1.3	1.5	1.5
DEGR.	*	20	10	10	0	0	320	320	320	330	330	330	330	320	320	180	180	170

THE HIGHEST CONCENTRATION OF 1.50 ppm OCCURRED AT RECEPTOR REC117.

FF

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**********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/11/2012 11:30:56 AM
** File: F:\2975 FirstLight\Microscale\Worst\12 Hart & County LOS\2022APM.ou2
**
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: First Light - Taunton - Hart & County Sts- 2022 Build A PM RUN: CAL3QHC
RUN

DATE : 12/11/12
TIME : 11:30:53

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE
VPH EF H W V/C QUEUE	*	X1	Y1	X2	Y2	*	(M)		
	*	(DEG)	(G/MI)	(M)	(M)	(VEH)			
1. Hart EB TL	*	235870.27	848335.69	235946.16	848348.19	*	77.	81.	AG
228. 8.5 0.0 9.4									
2. Hart EB TL QUEUE	*	235946.16	848348.19	235907.91	848341.88	*	39.	261.	AG
95. 100.0 0.0 3.4 0.69 6.5									
3. Hart EB RL	*	235910.48	848343.12	235945.62	848345.50	*	35.	86.	AG

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 327.   8.5   0.0    9.0
 4. Hart EB RL QUEUE                  *  235945.62    848345.50   235903.75    848342.69 *      42.   266. AG
 72. 100.0   0.0    3.0 0.47   7.0
 5. Hart WB LT                        *  236039.62    848367.12   235970.39    848354.56 *      70.   260. AG
 271.   8.5   0.0    9.4
 6. Hart WB LT QUEUE                  *  235970.39    848354.56   236016.12    848362.88 *      46.    80. AG
 95. 100.0   0.0    3.4 0.82   7.7
 7. Hart WB RL                        *  236019.66    848365.25   235969.06    848357.75 *      51.   262. AG
 229.   8.5   0.0    9.0
 8. Hart WB RL QUEUE                  *  235969.06    848357.75   236000.39    848362.38 *      32.    81. AG
 77. 100.0   0.0    3.0 0.38   5.3
 9. 140 NB L                          *  235982.64    848282.94   235962.94    848336.75 *      57.   340. AG
 257.   8.5   0.0    9.4
10. 140 NB L QUEUE                    *  235962.94    848336.75   236058.55    848075.62 *     278.   160. AG
104. 100.0   0.0    3.4 1.37  46.3
11. 140 NB TRL                        *  235983.98    848285.06   235965.06    848337.00 *      55.   340. AG
766.   8.5   0.0    9.0
12. 140 NB TRL QUEUE                  *  235965.06    848337.00   236286.22    847455.44 *     938.   160. AG
84. 100.0   0.0    3.0 1.52 156.4
13. 140 SB LL                         *  235919.00    848421.94   235949.36    848359.12 *      70.   154. AG
146.   8.5   0.0    9.4
14. 140 SB LL QUEUE                   *  235949.36    848359.12   235869.72    848523.94 *     183.   334. AG
110. 100.0   0.0    3.4 1.46  30.5
15. 140 SB TR                         *  235919.53    848419.00   235945.62    848359.38 *      65.   156. AG
960.   8.5   0.0    9.4
16. 140 SB TR QUEUE                   *  235945.62    848359.38   235194.02    850076.81 *    1875.   336. AG
90. 100.0   0.0    3.4 2.38 312.5
17. Hart EB OUTBOUND                  *  235965.73    848350.19   236039.41    848363.12 *      75.    80. AG
560.   8.5   0.0    9.4
18. Hart WB OUTBOUND                  *  235941.72    848352.06   235869.94    848338.81 *      73.   260. AG
428.   8.5   0.0    9.4
19. 140 NB OUTBOUND                   *  235952.52    848359.88   235923.64    848423.31 *      70.   336. AG
941.   8.5   0.0    9.4
20. 140 SB OUTBOUND                   *  235956.02    848338.31   235978.42    848283.25 *      59.   158. AG
1387.   8.5   0.0    9.4
21. EBL                               *  235946.53    848348.12   235953.55    848359.31 *      13.    32. AG
71.   9.4   0.0    9.0
22. EBT                               *  235946.27    848348.31   235965.38    848350.44 *      19.    84. AG
157.   8.5   0.0    9.0
23. EBR                               *  235944.44    848346.44   235956.19    848338.50 *      14.   124. AG
```

327. 10.3 0.0 9.0
24. WBL * 235969.30 848354.88 235956.00 848339.56 * 20. 221. AG
121. 9.4 0.0 9.0
25. WBT * 235969.11 848354.62 235942.53 848351.69 * 27. 264. AG
150. 8.5 0.0 9.0
26. WBR * 235967.92 848357.19 235952.72 848359.31 * 15. 278. AG
229. 10.3 0.0 9.0
27. NBL * 235962.92 848337.50 235942.34 848352.00 * 25. 305. AG
257. 9.4 0.0 9.0
28. NBT * 235964.83 848337.69 235952.81 848359.44 * 25. 331. AG
641. 8.5 0.0 9.0
29. NBR * 235964.45 848338.56 235967.66 848350.31 * 12. 15. AG
125. 10.3 0.0 9.0
30. SBL * 235949.27 848359.25 235965.19 848350.25 * 18. 119. AG
146. 9.4 0.0 9.0
31. SBT * 235945.70 848359.44 235956.09 848338.94 * 23. 153. AG
939. 8.5 0.0 9.0
32. SBR * 235946.34 848359.62 235939.53 848350.81 * 11. 218. AG
21. 10.3 0.0 9.0

FF

JOB: First Light - Taunton - Hart & County Sts- 2022 Build A PM RUN: CAL3QHC
RUN

DATE : 12/11/12
TIME : 11:30:53

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Hart EB TL QUEUE	*	132	102	5.0	228	1900	45.89	2	3
4. Hart EB RL QUEUE	*	132	77	5.0	327	1900	45.89	2	3
6. Hart WB LT QUEUE	*	132	102	5.0	271	1900	45.89	2	3
8. Hart WB RL QUEUE	*	132	83	5.0	229	1900	45.89	2	3
10. 140 NB L QUEUE	*	132	112	5.0	257	1900	45.89	2	3

12. 140 NB TRL QUEUE	*	132	90	5.0	766	1900	45.89	2	3
14. 140 SB LL QUEUE	*	132	118	5.0	146	1900	45.89	2	3
16. 140 SB TR QUEUE	*	132	97	5.0	960	1900	45.89	2	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235961.95	848360.62	1.8	*
2. LR_2	*	235956.00	848363.88	1.8	*
3. LR_3	*	235953.88	848368.38	1.8	*
4. LR_4	*	235951.77	848372.94	1.8	*
5. LR_5	*	235949.66	848377.50	1.8	*
6. LR_6	*	235947.55	848382.00	1.8	*
7. LR_7	*	235945.42	848386.50	1.8	*
8. LR_8	*	235943.31	848391.06	1.8	*
9. LR_9	*	235941.19	848395.56	1.8	*
10. LR_10	*	235939.06	848400.12	1.8	*
11. LR_11	*	235936.95	848404.62	1.8	*
12. LR_12	*	235934.84	848409.19	1.8	*
13. LR_13	*	235932.73	848413.69	1.8	*
14. LR_14	*	235930.61	848418.25	1.8	*
15. LR_15	*	235928.50	848422.75	1.8	*
16. LR_16	*	235913.59	848419.25	1.8	*
17. LR_17	*	235915.72	848414.69	1.8	*
18. LR_18	*	235917.83	848410.19	1.8	*
19. LR_19	*	235919.95	848405.62	1.8	*
20. LR_20	*	235922.06	848401.12	1.8	*
21. LR_21	*	235924.19	848396.56	1.8	*
22. LR_22	*	235926.30	848392.06	1.8	*
23. LR_23	*	235928.41	848387.50	1.8	*
24. LR_24	*	235930.52	848383.00	1.8	*
25. LR_25	*	235932.64	848378.50	1.8	*
26. LR_26	*	235934.75	848373.94	1.8	*
27. LR_27	*	235936.88	848369.44	1.8	*
28. LR_28	*	235938.98	848364.88	1.8	*
29. LR_29	*	235941.09	848360.31	1.8	*
30. LR_31	*	235969.44	848342.38	1.8	*
31. LR_32	*	235970.98	848345.12	1.8	*

32. LR_33	*	235975.58	848347.31	1.8 *
33. LR_34	*	235980.50	848348.19	1.8 *
34. LR_35	*	235985.42	848349.12	1.8 *
35. LR_36	*	235990.34	848350.00	1.8 *
36. LR_37	*	235995.27	848350.94	1.8 *

FF

JOB: First Light - Taunton - Hart & County Sts- 2022 Build A PM RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
37. LR_38	*	236000.19	848351.81	1.8 *
38. LR_39	*	236005.09	848352.69	1.8 *
39. LR_40	*	236010.02	848353.62	1.8 *
40. LR_41	*	236014.94	848354.50	1.8 *
41. LR_42	*	236019.84	848355.38	1.8 *
42. LR_43	*	236024.77	848356.31	1.8 *
43. LR_44	*	236029.69	848357.19	1.8 *
44. LR_45	*	236034.61	848358.12	1.8 *
45. LR_46	*	236039.53	848359.00	1.8 *
46. LR_47	*	236041.47	848373.19	1.8 *
47. LR_48	*	236036.55	848372.31	1.8 *
48. LR_49	*	236031.62	848371.44	1.8 *
49. LR_50	*	236026.70	848370.50	1.8 *
50. LR_51	*	236021.80	848369.62	1.8 *
51. LR_52	*	236016.88	848368.69	1.8 *
52. LR_53	*	236011.95	848367.81	1.8 *
53. LR_54	*	236007.05	848366.94	1.8 *
54. LR_55	*	236002.12	848366.00	1.8 *
55. LR_56	*	235997.20	848365.12	1.8 *
56. LR_57	*	235992.28	848364.25	1.8 *
57. LR_58	*	235987.38	848363.31	1.8 *
58. LR_59	*	235982.45	848362.44	1.8 *
59. LR_60	*	235977.53	848361.50	1.8 *
60. LR_61	*	235972.61	848360.62	1.8 *
61. LR_62	*	235967.69	848359.75	1.8 *
62. LR_64	*	235938.45	848355.44	1.8 *
63. LR_65	*	235933.53	848354.56	1.8 *
64. LR_66	*	235928.59	848353.69	1.8 *

65.	LR_67	*	235923.69	848352.88	1.8 *
66.	LR_68	*	235918.75	848352.00	1.8 *
67.	LR_69	*	235913.83	848351.12	1.8 *
68.	LR_70	*	235908.91	848350.25	1.8 *
69.	LR_71	*	235903.97	848349.44	1.8 *
70.	LR_72	*	235899.05	848348.56	1.8 *
71.	LR_73	*	235894.12	848347.69	1.8 *
72.	LR_74	*	235889.20	848346.88	1.8 *
73.	LR_75	*	235884.27	848346.00	1.8 *
74.	LR_76	*	235879.34	848345.12	1.8 *
75.	LR_77	*	235874.42	848344.25	1.8 *
76.	LR_78	*	235869.48	848343.44	1.8 *
77.	LR_79	*	235871.02	848332.75	1.8 *
78.	LR_80	*	235875.95	848333.56	1.8 *
79.	LR_81	*	235880.88	848334.44	1.8 *
80.	LR_82	*	235885.80	848335.31	1.8 *
81.	LR_83	*	235890.73	848336.12	1.8 *
82.	LR_84	*	235895.66	848337.00	1.8 *
83.	LR_85	*	235900.58	848337.88	1.8 *
84.	LR_86	*	235905.50	848338.75	1.8 *
85.	LR_87	*	235910.44	848339.56	1.8 *
86.	LR_88	*	235915.36	848340.44	1.8 *
87.	LR_89	*	235920.28	848341.31	1.8 *
88.	LR_90	*	235925.38	848341.50	1.8 *
89.	LR_91	*	235930.12	848341.56	1.8 *
90.	LR_92	*	235935.22	848341.44	1.8 *
91.	LR_93	*	235940.47	848342.31	1.8 *
92.	LR_94	*	235945.70	848340.75	1.8 *
93.	LR_96	*	235948.52	848339.25	1.8 *

FF

JOB: First Light - Taunton - Hart & County Sts- 2022 Build A PM RUN: CAL3QHC
RUN

	RECEPTOR	*	COORDINATES (M) X	Y	Z *
94.	LR_97	*	235952.20	848335.62	1.8 *
95.	LR_98	*	235954.11	848331.00	1.8 *
96.	LR_99	*	235956.02	848326.38	1.8 *
97.	LR_100	*	235957.94	848321.75	1.8 *

98.	LR_101	*	235959.84	848317.12	1.8 *
99.	LR_102	*	235961.77	848312.50	1.8 *
**.	LR_103	*	235963.67	848307.88	1.8 *
**.	LR_104	*	235965.58	848303.25	1.8 *
**.	LR_105	*	235967.50	848298.69	1.8 *
**.	LR_106	*	235969.41	848294.06	1.8 *
**.	LR_107	*	235971.31	848289.44	1.8 *
**.	LR_108	*	235973.23	848284.81	1.8 *
**.	LR_109	*	235988.36	848288.12	1.8 *
**.	LR_110	*	235986.45	848292.75	1.8 *
**.	LR_111	*	235984.55	848297.38	1.8 *
**.	LR_112	*	235982.62	848302.00	1.8 *
**.	LR_113	*	235980.70	848306.62	1.8 *
**.	LR_114	*	235978.80	848311.25	1.8 *
**.	LR_115	*	235976.89	848315.88	1.8 *
**.	LR_116	*	235974.98	848320.50	1.8 *
**.	LR_117	*	235973.06	848325.12	1.8 *
**.	LR_118	*	235971.16	848329.75	1.8 *
**.	LR_119	*	235969.23	848334.38	1.8 *
**.	LR_120	*	235967.33	848339.00	1.8 *

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	* 0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.6	0.6	0.8	1.	1.

```
  10.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
  0.7    0.9     1.    1.1
  20.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
  0.7    0.9    1.1    1.1
  30.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.5
  0.7    0.9     1.    1.1
  40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.5
  0.7    0.9    0.9    0.9
  50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.5
  0.7    0.9    0.9    0.9
  60.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.5
  0.8    0.9    0.9    0.9
  70.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.5
  0.9    0.9    0.9    0.9
  80.  *    0.5    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
  0.9    0.9    0.9    0.9
  90.  *    0.8    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.8
  1.    0.9    0.9    0.9
 100.  *    0.8    0.6    0.3    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.9
 1.     1.     1.     1.
 110.  *    0.8    0.4    0.3    0.3    0.3    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     1.
 1.1    1.1    1.1    1.1
 120.  *    0.4    0.4    0.3    0.3    0.3    0.3    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     1.2
 1.3    1.3    1.3    1.3

 ------*-----------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *    0.8    0.6    0.3    0.3    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     1.2
 1.3    1.3    1.3    1.3
 DEGR. *     90    100    100    100    110    120    120      0      0      0      0      0      0      0      0    120
 120    120    120    120
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
130.	*	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	1.2	1.3	1.3	1.3	1.3
140.	*	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	1.3	1.4	1.4	1.5	1.4
150.	*	0.5	0.6	0.7	0.6	0.7	0.7	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	1.3	1.3	1.3	1.2	1.2
160.	*	0.9	1.	1.	1.	1.	1.1	1.	1.	1.	1.	1.	1.	1.1	1.2	1.2	0.8	0.9	0.9	0.8	0.8
170.	*	0.9	1.	1.2	0.9	1.	1.	1.1	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.3	0.1	0.1	0.1	0.1	0.1
180.	*	0.7	0.8	0.7	0.9	0.8	1.	1.	1.	0.9	1.	1.	1.1	1.1	1.2	1.2	0.	0.	0.1	0.1	0.1
190.	*	0.7	0.7	0.6	0.6	0.9	1.1	1.	1.1	1.1	1.1	1.	1.	1.1	1.1	1.1	0.	0.	0.	0.	0.
200.	*	0.5	0.5	0.7	0.9	1.1	1.	1.	1.	1.	0.9	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
210.	*	0.4	0.6	0.8	1.	1.	1.1	1.	1.	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
220.	*	0.4	0.6	1.1	1.1	1.1	1.1	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
230.	*	0.6	0.8	1.1	1.1	1.	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
240.	*	0.6	0.8	1.1	0.9	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.	0.	0.	0.	0.
250.	*	0.6	1.1	0.9	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.	0.	0.	0.	0.
260.	*	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.6	0.	0.	0.	0.	0.
270.	*	0.7	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.6	0.	0.	0.	0.	0.

```
 280.  *    0.7    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.5     0.
 0.     0.     0.     0.
 290.  *    0.8    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.7    0.5     0.
 0.     0.     0.     0.
 300.  *    0.7    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    0.9    0.7    0.6     0.
 0.     0.     0.     0.
 310.  *    0.9    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.     1.    0.9    0.7    0.6     0.
 0.     0.     0.     0.
 320.  *    0.8    1.2    1.2    1.2    1.2    1.1    1.1    1.1     1.     1.     1.    0.9    0.9    0.8    0.7    0.2
 0.2    0.2    0.3    0.3
 330.  *    0.7     1.     1.    1.1     1.     1.     1.     1.     1.    0.9    0.8    0.8    0.7    0.7    0.6    0.4
 0.4    0.5    0.5    0.5
 340.  *    0.3    0.7    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.4    0.3    0.7
 0.7    0.8    0.9    0.9
 350.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.8
 0.8    0.9     1.    1.2
 360.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.    0.6
 0.6    0.8     1.     1.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.9    1.2    1.2    1.2    1.2    1.1    1.1    1.2    1.2    1.3    1.3    1.3    1.4    1.4    1.3    1.3
 1.4    1.4    1.5    1.4
 DEGR. *    160    320    170    320    320    160    170    170    170    170    170    170    170    170    170    140
 140    140    140    140
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
*	REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36

```
 REC37  REC38  REC39  REC40

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *    1.2    1.3    1.4    1.4    1.4    1.4    1.5    1.5    1.5    0.3    0.3    0.6    0.6    0.6    0.6    0.6
   0.6    0.5    0.5    0.4
 10.  *    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    0.3    0.4    0.6    0.6    0.6    0.6    0.6
 0.5    0.5    0.5    0.4
 20.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    0.3    0.6    0.6    0.6    0.6    0.6    0.6
 0.5    0.5    0.5    0.3
 30.  *    1.1    1.1    1.1    1.1    1.1     1.     1.     1.     1.    0.5    0.6    0.6    0.6    0.6    0.6    0.5
 0.5    0.5    0.4    0.3
 40.  *    0.9    0.9     1.     1.     1.     1.     1.     1.     1.    0.6    0.6    0.7    0.7    0.7    0.7    0.5
 0.5    0.5    0.4    0.3
 50.  *    0.9    0.9    0.9     1.     1.     1.     1.     1.     1.    0.6    0.6    0.7    0.7    0.7    0.5    0.5
 0.5    0.4    0.3    0.3
 60.  *    0.9    0.9    0.9    0.9     1.     1.     1.     1.     1.    0.5    0.6    0.7    0.7    0.6    0.6    0.5
 0.5    0.5    0.3    0.3
 70.  *    0.9    0.9    0.9    0.9    0.9     1.     1.     1.     1.    0.3    0.4    0.5    0.5    0.5    0.5    0.5
 0.4    0.3    0.2    0.2
 80.  *    0.9    0.9    0.9     1.     1.     1.     1.     1.    1.1    0.1    0.3    0.3    0.3    0.3    0.2    0.2
 0.2    0.2    0.2    0.2
 90.  *    0.9    0.9    0.9     1.     1.     1.    1.1    1.3    1.2     0.    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.1    0.1    0.1
100.  *    1.1    1.1    1.1    1.1    1.2    1.2    1.3    1.3    1.2     0.    0.    0.1    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
110.  *    1.1    1.1    1.2    1.2    1.3    1.3    1.2    1.3    0.9     0.    0.    0.     0.     0.     0.     0.
0.     0.     0.     0.
120.  *    1.3    1.3    1.3    1.3    1.3    1.2    1.1    0.9    0.6     0.    0.    0.     0.     0.     0.     0.
0.     0.     0.     0.
130.  *    1.3    1.3    1.3    1.2    1.2    1.2    1.1     1.     1.     0.    0.    0.     0.     0.     0.     0.
0.     0.     0.     0.
140.  *    1.5    1.5    1.4    1.5    1.6    1.4    1.3     1.    1.1     0.    0.    0.     0.     0.     0.     0.
0.     0.     0.     0.
150.  *    1.3    1.3    1.2    1.3    1.1    1.2    1.2    1.3    1.3    0.3    0.2    0.1     0.     0.     0.     0.
0.     0.     0.     0.
160.  *    0.8    0.8    0.9    0.8    0.9    0.8    0.7    0.8    0.9    0.8    0.6    0.3    0.2    0.2    0.2    0.1
0.1    0.1     0.     0.
170.  *    0.2    0.2    0.2    0.2    0.2    0.3    0.6    0.7    0.6    1.2    0.9    0.6    0.5    0.2    0.2    0.2
0.2    0.2    0.2    0.1
```

```
180.  *    0.2    0.2    0.2    0.3    0.3    0.3    0.4    0.4    0.3    1.3     1.    0.6    0.5    0.4    0.2    0.2
0.2    0.2    0.2    0.2
190.  *     0.    0.1    0.1    0.2    0.2    0.3    0.3    0.3    0.4    1.1    0.9    0.8    0.5    0.4    0.4    0.3
0.2    0.2    0.2    0.2
200.  *     0.     0.     0.    0.1    0.3    0.3    0.3    0.3    0.4     1.    0.9    0.6    0.5    0.4    0.4    0.4
0.4    0.3    0.2    0.2
210.  *     0.     0.     0.     0.    0.2    0.3    0.3    0.3    0.5    0.8    0.6    0.5    0.5    0.5    0.4    0.4
0.4    0.4    0.4    0.3
220.  *     0.     0.     0.     0.    0.1    0.2    0.3    0.3    0.5    0.6    0.6    0.5    0.5    0.4    0.4    0.4
0.4    0.4    0.4    0.4
230.  *     0.     0.     0.     0.     0.    0.1    0.1    0.3    0.5    0.5    0.4    0.5    0.4    0.4    0.4    0.4
0.4    0.4    0.4    0.3
240.  *     0.     0.     0.     0.     0.     0.    0.1    0.2    0.3    0.4    0.2    0.2    0.2    0.2    0.2    0.3
0.3    0.3    0.3    0.3
250.  *     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.5    0.4    0.4    0.4    0.3    0.2    0.2
0.2    0.2    0.2    0.2
260.  *     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.7    0.5    0.5    0.5    0.4    0.5    0.5
0.2    0.3    0.3    0.3
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.8    0.7    0.6    0.7    0.6    0.6    0.6
0.4    0.6    0.6    0.7
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.7    0.6    0.4    0.5    0.5    0.4    0.5
0.7    0.7    0.7    0.7
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.6    0.3    0.7    0.9    0.7     1.     1.
1.    1.1    1.1    1.1
300.  *     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.6    0.7    0.7    0.7     1.     1.     1.
1.1    1.1    1.1     1.
310.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.7    0.7    0.7    0.9     1.     1.     1.
1.     1.    0.9    0.8
320.  *    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.8    0.9    0.9     1.     1.    0.9    0.8
0.8    0.8    0.8    0.7
330.  *    0.7    0.7    0.7    0.8    0.8    0.8    0.8    0.9     1.    0.9    0.7    0.8    0.9    0.8    0.8    0.7
0.7    0.7    0.6    0.6
340.  *     1.    1.1    1.2    1.2    1.2    1.2    1.3    1.4    1.4    0.4    0.4    0.7    0.7    0.7    0.7    0.7
0.7    0.5    0.5    0.5
350.  *    1.2    1.3    1.3    1.4    1.6    1.6    1.7    1.7    1.7    0.1    0.4    0.6    0.6    0.6    0.6    0.6
0.6    0.5    0.5    0.5
360.  *    1.2    1.3    1.4    1.4    1.4    1.4    1.5    1.5    1.5    0.3    0.3    0.6    0.6    0.6    0.6    0.6
0.6    0.5    0.5    0.4

------*-----------------------------------------------------------------------------------------------------------
```

```
 ---------------------
 MAX   *    1.5    1.5    1.4    1.5    1.6    1.6    1.7    1.7    1.7    1.3     1.    0.9     1.     1.     1.     1.
 1.1    1.1    1.1    1.1
 DEGR. *    140    140      0    140    140    350    350    350    350    180    180    320    320    300    290    290
 300    290    290    290
```



```
       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC41  REC42  REC43  REC44  REC45  REC46  REC47  REC48  REC49  REC50  REC51  REC52  REC53  REC54  REC55  REC56
 REC57  REC58  REC59  REC60

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.3    0.3    0.3    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
   0.     0.     0.     0.
  10.  *    0.3    0.3    0.3    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  20.  *    0.3    0.3    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  30.  *    0.3    0.3    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  40.  *    0.3    0.3    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  50.  *    0.3    0.3    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
  60.  *    0.3    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.    0.1    0.1
  70.  *    0.2    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1
  0.1    0.2    0.2    0.3
```

```
 80.  *    0.2    0.1    0.1    0.1    0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.3    0.4
 0.5    0.6    0.6    0.6
 90.  *    0.1    0.1    0.1    0.1    0.     0.     0.     0.     0.     0.1    0.1    0.2    0.3    0.4    0.4    0.6
 0.7    0.8    0.8    0.9
100.  *    0.1    0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.3    0.4    0.4    0.5    0.7
1.     1.    1.1    1.1
110.  *    0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.3    0.4    0.5    0.6    0.9
1.     1.    1.1    1.1
120.  *    0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.3    0.5    0.5    0.7    0.9
0.9    1.     1.     1.
130.  *    0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.4    0.5    0.5    0.6    0.8
0.8    0.8    0.8    0.8
140.  *    0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.4    0.5    0.5    0.7    0.7
0.8    0.8    0.8    0.8
150.  *    0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.5    0.5    0.5    0.7    0.7
0.7    0.8    0.8    0.9
160.  *    0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.3    0.5    0.5    0.6    0.8    0.8
0.9    1.     1.     1.
170.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.4    0.6    0.7    0.7    0.9    0.9
0.9    0.9    1.2    1.4
180.  *    0.2    0.2    0.2    0.2    0.1    0.1    0.3    0.4    0.4    0.4    0.6    0.7    0.7    0.7    0.9    0.9
1.     1.1    1.3    1.3
190.  *    0.2    0.2    0.2    0.2    0.2    0.3    0.4    0.4    0.4    0.4    0.6    0.7    0.7    0.8     1.    1.1
1.1    1.2    1.3    1.3
200.  *    0.2    0.2    0.2    0.2    0.1    0.2    0.3    0.3    0.4    0.4    0.7    0.7    0.8     1.    1.1    1.1
1.2    1.2    1.3    1.2
210.  *    0.2    0.2    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.5    0.8    0.9     1.    1.1    1.3    1.3
1.2    1.2     1.    0.8
220.  *    0.3    0.2    0.2    0.1    0.1    0.3    0.4    0.4    0.5    0.6    0.8    0.8     1.    1.1    1.2    1.1
1.1    0.9     1.    0.7
230.  *    0.2    0.2    0.2    0.2    0.2    0.3    0.4    0.5    0.5    0.7    0.8    0.9    0.8     1.     1.     1.
0.9    1.1    0.9    0.4
240.  *    0.3    0.2    0.2    0.2    0.2    0.5    0.5    0.5    0.7    0.9    0.8    0.8    0.8    0.9    0.8    0.8
1.     0.9    0.8    0.7
250.  *    0.2    0.2    0.3    0.3    0.3    0.3    0.3    0.6    0.6    0.6    0.6    0.6    0.7    0.8    0.9     1.
1.     0.9    0.7    0.7
260.  *    0.3    0.3    0.4    0.4    0.4    0.3    0.4    0.5    0.5    0.6    0.5    0.5    0.5    0.5    0.5    0.5
0.6    0.5    0.6    0.6
270.  *    0.7    0.7    0.7    0.7    0.5     0.    0.1    0.1    0.1    0.2    0.3    0.2    0.4    0.4    0.5    0.5
0.5    0.5    0.6    0.6
```

```
 280.  *    0.8    0.8    0.8    0.6    0.5    0.1    0.1    0.2    0.2    0.3    0.3    0.4    0.4    0.4    0.4    0.4
 0.4    0.4    0.4    0.4
 290.  *    1.1     1.    0.7    0.5    0.5    0.1    0.1    0.1    0.2    0.3    0.3    0.4    0.4    0.4    0.4    0.4
 0.4    0.4    0.4    0.4
 300.  *    0.9    0.7    0.6    0.5    0.5    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.4    0.4
 0.4    0.4    0.4    0.5
 310.  *    0.8    0.6    0.5    0.5    0.4    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.3
 0.4    0.4    0.4    0.6
 320.  *    0.7    0.4    0.4    0.4    0.4    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2
 0.2    0.3    0.3    0.5
 330.  *    0.5    0.4    0.4    0.4    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.2    0.2    0.4
 340.  *    0.4    0.3    0.3    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 350.  *    0.3    0.3    0.3    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 360.  *    0.3    0.3    0.3    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.1     1.    0.8    0.7    0.5    0.5    0.5    0.6    0.7    0.9    0.8    0.9     1.    1.1    1.3    1.3
 1.2    1.2    1.3    1.4
 DEGR. *    290    290    280    270    270    240    240    250    240    240    210    210    210    210    210    210
 200    190    180    170
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
```

```
 REC77  REC78  REC79  REC80

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *     0.     1.    0.7    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1
   0.2    0.3    0.3    0.4
  10.  *     0.    0.9    0.8    0.6    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2
  0.4    0.4    0.4    0.4
  20.  *     0.    0.9    0.7    0.5    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2
  0.4    0.4    0.4    0.4
  30.  *     0.    0.8    0.6    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.1
  0.3    0.4    0.4    0.5
  40.  *     0.    0.8    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.1    0.1
  0.3    0.4    0.5    0.6
  50.  *     0.    0.8    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.2
  0.5    0.5    0.6    0.6
  60.  *    0.1    0.5    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.2
  0.3    0.3    0.3    0.5
  70.  *    0.3    0.5    0.6    0.6    0.5    0.5    0.5    0.4    0.4    0.4    0.3    0.1    0.1    0.1    0.1    0.1
  0.5    0.5    0.5    0.5
  80.  *    0.8    0.7    0.6    0.4    0.4    0.3    0.4    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3
  0.4    0.4    0.4    0.4
  90.  *     1.    0.6    0.7    0.5    0.6    0.6    0.7    0.6    0.6    0.7    0.7    0.5    0.5    0.5    0.5    0.5
  0.1    0.2    0.3    0.4
 100.  *    1.1    0.6    0.6    0.5    0.6    0.6    0.8    0.8    0.8    0.9    0.9    0.6    0.6    0.6    0.6    0.5
 0.2    0.2    0.2    0.2
 110.  *    1.1    0.5    0.6    0.8    0.9    0.9    0.9     1.     1.     1.    0.7    0.7    0.7    0.5    0.5    0.5
 0.2    0.2    0.2    0.2
 120.  *     1.    0.7     1.    1.1    1.1    1.1    1.2    1.2    1.1    0.9    0.8    0.6    0.5    0.5    0.4    0.4
 0.1    0.1    0.1    0.1
 130.  *    0.7    1.1    1.3    1.1    1.1     1.     1.     1.     1.    0.7    0.5    0.4    0.4    0.4    0.4    0.3
 0.1    0.2    0.2    0.2
 140.  *    0.6    1.1    1.2    1.1    0.9    0.9    0.9     1.    0.7    0.5    0.4    0.4    0.4    0.4    0.4    0.3
 0.1    0.2    0.2    0.2
 150.  *    0.5    1.4    1.1    0.9    0.9    0.8    0.8    0.8    0.6    0.5    0.3    0.3    0.3    0.3    0.3    0.2
 0.    0.1    0.1    0.1
 160.  *    0.9    0.9    0.9    0.8    0.8    0.7    0.7    0.7    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.1
 0.     0.     0.     0.
 170.  *    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1
 0.     0.     0.     0.
```

```
 180.  *    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.
 0.     0.     0.     0.
 190.  *    0.8    0.6    0.6    0.6    0.6    0.6    0.6    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.
 0.     0.     0.     0.
 200.  *    0.5    0.6    0.6    0.6    0.6    0.6    0.5    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.
 0.     0.     0.     0.
 210.  *    0.4    0.6    0.6    0.6    0.6    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.
 0.     0.     0.     0.
 220.  *    0.3    0.7    0.7    0.7    0.7    0.6    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.1    0.1    0.
 0.     0.     0.     0.
 230.  *    0.4    0.7    0.7    0.7    0.6    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1    0.
 0.     0.     0.     0.
 240.  *    0.6    0.7    0.7    0.6    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.2    0.1    0.1    0.1    0.
 0.     0.     0.     0.
 250.  *    0.7    0.5    0.5    0.5    0.4    0.3    0.3    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.
 0.     0.     0.    0.1
 260.  *    0.6    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1     0.     0.
 0.     0.    0.1    0.1
 270.  *    0.7    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.
 0.     0.    0.1    0.2
 280.  *    0.5    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 290.  *    0.7     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.2    0.2
 300.  *    0.7     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 310.  *    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 320.  *    0.7     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 330.  *    0.4    0.4    0.2    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 340.  *    0.2    0.8    0.4    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.3    0.3    0.3
 350.  *     0.     1.    0.7    0.6    0.4    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1
 0.2    0.3    0.3    0.3
 360.  *     0.     1.    0.7    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1
 0.2    0.3    0.3    0.4

------*-----------------------------------------------------------------------------------------------------------------
```

```
 ---------------------
MAX   *    1.1    1.4    1.3    1.1    1.1    1.1    1.2    1.2    1.1     1.    0.9    0.7    0.7    0.6    0.6    0.5
0.5    0.5    0.6    0.6
DEGR. *    100    150    130    120    120    120    120    120    120    110    100    110    110    100    100     90
50     50     50     40
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

```
WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC81  REC82  REC83  REC84  REC85  REC86  REC87  REC88  REC89  REC90  REC91  REC92  REC93  REC94  REC95  REC96
REC97  REC98  REC99  REC100

------*-----------------------------------------------------------------------------------------------------------------
---------------------
   .  *    0.4    0.4    0.4    0.6    0.9     1.    1.1    1.2    1.2    1.4    1.5    1.2    1.1    1.1    1.1    0.9
  0.9    0.9     1.     1.
 10.  *    0.4    0.4    0.4    0.6    1.1    1.2    1.2    1.2    1.2    1.3    1.3    0.9    0.8    0.8    0.8    0.6
 0.7    0.9    1.1    1.1
 20.  *    0.4    0.4    0.5    0.9    1.2    1.2    1.2    1.2    1.2    1.1    1.1    0.7    0.7    0.7    0.6    0.5
 0.9     1.    1.1    1.2
 30.  *    0.6    0.6    0.7    0.9    1.3    1.3    1.4    1.3    1.2    1.3    1.1    0.5    0.6    0.6    0.7    0.8
 1.    1.2    1.3    1.2
 40.  *    0.6    0.6    0.7     1.    1.3    1.4    1.4    1.4    1.4     1.     1.    0.5    0.5    0.9    0.8    1.1
 1.1    1.1    1.2     1.
 50.  *    0.6    0.8     1.    1.2    1.5    1.5    1.5    1.3    1.2    0.8    0.9    0.5    0.8    0.9    0.9     1.
 1.1    1.1    0.9     1.
 60.  *    0.5    0.5    0.8    1.1    1.1    1.1    1.2    1.1     1.     1.    1.1    0.8    0.8    0.8     1.    1.1
 1.    0.9    0.9    0.9
 70.  *    0.4    0.7    0.8     1.    1.3    1.3    1.3    1.2    1.1    1.2     1.    0.8    0.8    0.7    0.8    0.9
 0.9    0.9    0.9    0.9
```

```
 80.  *    0.4    0.7    0.7    0.9     1.    1.2    1.2     1.    0.9    0.8    0.8    0.7    0.8    0.8    0.8    0.9
 0.9    0.9    0.9    0.9
 90.  *    0.4    0.4    0.5    0.6    0.6    0.7    0.8    0.6    0.4    0.6    0.6    0.6    0.5    0.7    0.9    0.9
 0.9    0.9     1.     1.
100.  *    0.2    0.2    0.4    0.4    0.5    0.6    0.6    0.4    0.4    0.6    0.6    0.8    0.9    0.8    0.9    0.9
1.     1.     1.     1.
110.  *    0.2    0.2    0.3    0.3    0.4    0.4    0.5    0.5    0.5    0.5    0.7    0.7    0.8     1.    1.1    1.1
1.1    1.1    1.1    1.1
120.  *    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.5    0.5    0.5    0.6    0.8    0.9    1.1    1.1    1.1
1.1    1.2    1.2    1.2
130.  *    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.4    0.5    0.5    0.7    0.9     1.    1.3    1.3    1.3
1.3    1.3    1.3    1.2
140.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.6    0.7    0.9    1.1    1.5    1.4    1.4
1.4    1.3    1.3    1.3
150.  *    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.5    0.8    0.9    1.3    1.3    1.2
1.2    1.2    1.2    1.1
160.  *     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.2    0.2    0.3    0.4    0.6    0.9    0.9    0.9
0.9    0.9    0.8    0.8
170.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.3    0.5    0.5    0.5
0.5    0.4    0.4    0.4
180.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1
0.1    0.1    0.1    0.1
190.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1
0.1    0.1    0.1    0.1
200.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.1    0.1    0.1
210.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
240.  *     0.     0.     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
250.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.2    0.1    0.2     0.     0.     0.     0.     0.
0.     0.     0.     0.
260.  *    0.1    0.2    0.2    0.2    0.2    0.4    0.6    0.5    0.5    0.5    0.5    0.3     0.     0.     0.     0.
0.     0.     0.     0.
270.  *    0.2    0.2    0.2    0.2    0.2    0.6    0.8    0.8    0.7    0.7    0.8    0.6    0.5    0.2     0.     0.
0.     0.     0.     0.
```

```
280.  *    0.2    0.2    0.2    0.2    0.4    0.9    1.1     1.    0.9    0.9     1.    0.7    0.7    0.4    0.2     0.
0.     0.     0.     0.
290.  *    0.2    0.2    0.2    0.2    0.4    0.8     1.     1.    0.9    0.9     1.    0.7    0.7    0.4    0.3    0.3
0.     0.     0.     0.
300.  *    0.2    0.2    0.2    0.2    0.5     1.     1.     1.    0.9    0.9    0.9    0.7    0.8    0.6    0.4    0.3
0.3    0.3    0.1    0.1
310.  *    0.2    0.2    0.2    0.2    0.6     1.     1.    0.9    0.9    0.9    0.9    0.8    0.8    0.5    0.4    0.3
0.3    0.3    0.3    0.2
320.  *    0.2    0.2    0.2    0.2    0.6    0.8    0.9    0.9    0.8    0.8    0.8    0.8    0.7    0.7    0.6    0.4
0.4    0.3    0.2    0.3
330.  *    0.2    0.2    0.2    0.3    0.7    0.8    0.9    0.9    0.9    0.8    0.9    1.2    1.1    1.2    0.9     1.
0.9    0.9    0.8    0.6
340.  *    0.3    0.3    0.3    0.4    0.8    0.9     1.     1.    1.1    1.1    1.3    1.5    1.3    1.3    1.2    1.2
1.1    1.1    1.1    1.1
350.  *    0.3    0.3    0.3    0.5    0.9     1.     1.    1.1    1.2    1.3    1.4    1.5    1.3    1.2    1.3    1.2
1.    1.1    1.3    1.3
360.  *    0.4    0.4    0.4    0.6    0.9     1.    1.1    1.2    1.2    1.4    1.5    1.2    1.1    1.1    1.1    0.9
0.9    0.9     1.     1.

------*-----------------------------------------------------------------------------------------------------------------
--------------------
MAX   *    0.6    0.8     1.    1.2    1.5    1.5    1.5    1.4    1.4    1.4    1.5    1.5    1.3    1.5    1.4    1.4
1.4    1.3    1.3    1.3
DEGR. *     30     50     50     50     50     50     50     40     40      0      0    340    340    140    140    140
140    130     30    140
```

FF PAGE 10

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)														
*	REC101	REC102	REC103	REC104	REC105	REC106	REC107	REC108	REC109	REC110	REC111	REC112	REC113	REC114	REC115	REC116

REC117

.	*	1.1	1.1	1.2	1.3	1.4	0.	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.3
10.	*	1.2	1.2	1.3	1.3	1.4	0.	0.	0.1	0.1	0.1	0.1	0.3	0.4	0.4	0.4	0.3	0.4
20.	*	1.2	1.3	1.2	1.2	1.2	0.	0.	0.	0.	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.3
30.	*	1.2	1.1	1.1	1.1	1.1	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.2	0.3	0.3	0.3
40.	*	1.	1.	1.	1.	1.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.2	0.3	0.4
50.	*	1.	1.	1.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.2	0.4
60.	*	1.	1.	1.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.3
70.	*	1.	1.	1.	1.	0.9	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2
80.	*	1.	1.	1.	1.	0.9	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
90.	*	1.	1.	1.	0.9	0.7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100.	*	1.	1.	1.	0.9	0.6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
110.	*	1.1	1.1	1.	0.9	0.6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
120.	*	1.2	1.1	1.1	0.9	0.6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.
130.	*	1.3	1.2	1.1	0.9	0.7	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1
140.	*	1.2	1.1	0.9	0.8	0.7	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3
150.	*	1.	1.	0.9	0.8	0.6	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.7	0.7
160.	*	0.8	0.7	0.7	0.6	0.5	0.5	0.6	0.7	0.8	0.8	0.9	1.1	1.2	1.3	1.3	1.3	1.3
170.	*	0.4	0.4	0.4	0.3	0.3	0.6	0.7	0.9	1.	1.3	1.3	1.3	1.5	1.5	1.5	1.6	1.7
180.	*	0.1	0.1	0.1	0.1	0.	0.6	0.7	0.8	1.1	1.1	1.3	1.5	1.6	1.6	1.6	1.6	1.6
190.	*	0.1	0.1	0.1	0.1	0.	0.6	0.7	1.	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.6	1.5
200.	*	0.1	0.1	0.1	0.	0.	0.5	0.7	1.	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.2
210.	*	0.	0.	0.	0.	0.	0.4	0.8	0.9	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.1
220.	*	0.	0.	0.	0.	0.	0.5	0.8	1.	1.	1.	1.	1.	1.1	1.2	1.2	1.2	1.
230.	*	0.	0.	0.	0.	0.	0.6	0.9	1.	1.	1.	1.	1.	1.	1.1	1.2	1.2	0.8
240.	*	0.	0.	0.	0.	0.	0.6	1.	1.	1.	1.	1.	1.	1.	1.1	1.1	1.2	0.8
250.	*	0.	0.	0.	0.	0.	0.9	1.	1.	1.	1.	1.	1.	1.	1.	1.1	1.2	0.4
260.	*	0.	0.	0.	0.	0.	0.9	1.	1.	1.	1.	1.	1.	1.	1.1	1.1	1.2	0.5
270.	*	0.	0.	0.	0.	0.	1.	1.	1.	1.	1.	1.	1.	1.	1.1	1.2	1.	0.9
280.	*	0.	0.	0.	0.	0.	1.	1.	1.	1.	1.	1.	1.	1.1	1.2	1.4	1.3	0.9
290.	*	0.	0.	0.	0.	0.1	1.	1.1	1.2	1.2	1.2	1.2	1.3	1.4	1.4	1.4	1.4	0.9
300.	*	0.1	0.1	0.1	0.1	0.1	1.2	1.2	1.2	1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.	0.7
310.	*	0.1	0.1	0.1	0.1	0.1	1.3	1.3	1.3	1.3	1.3	1.4	1.5	1.4	1.4	1.4	1.	1.
320.	*	0.3	0.3	0.2	0.2	0.2	1.4	1.5	1.6	1.6	1.6	1.6	1.7	1.6	1.5	1.3	1.1	1.
330.	*	0.6	0.7	0.6	0.6	0.6	1.3	1.4	1.4	1.4	1.5	1.6	1.6	1.5	1.5	1.1	1.	1.
340.	*	1.1	1.3	1.1	1.2	1.2	0.7	0.7	0.9	0.9	0.9	0.8	1.	1.	0.8	0.8	0.8	0.8
350.	*	1.2	1.3	1.4	1.4	1.4	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.4
360.	*	1.1	1.1	1.2	1.3	1.4	0.	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.3

MAX	*	1.3	1.3	1.4	1.4	1.4	1.4	1.5	1.6	1.6	1.6	1.6	1.7	1.6	1.6	1.6	1.6	1.7
DEGR.	*	130	20	350	350	0	320	320	320	320	320	320	320	180	180	180	170	170

THE HIGHEST CONCENTRATION OF 1.70 ppm OCCURRED AT RECEPTOR REC117.

FF

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*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/11/2012 11:31:51 AM
** File: F:\2975 FirstLight\Microscale\Worst\12 Hart & County LOS\2022ASA.ou2
**
*********************************************


                    CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221                    PAGE  1

     JOB: First Light - Taunton - Hart & County Sts- 2022 Build A Sat             RUN: CAL3QHC
     RUN

     DATE : 12/11/12
     TIME : 11:31:48

        The MODE flag has been set to C for calculating CO averages.

      SITE & METEOROLOGICAL VARIABLES
      -------------------------------
      VS =   0.0 CM/S       VD =   0.0 CM/S       Z0 = 100. CM
       U =  1.0 M/S         CLAS =   4  (D)     ATIM =  60. MINUTES     MIXH =  1000. M   AMB =  0.0 PPM

      LINK VARIABLES
      --------------
                 LINK DESCRIPTION               *              LINK COORDINATES (M)              *    LENGTH  BRG TYPE
                 VPH    EF      H     W    V/C QUEUE
                                               *       X1          Y1            X2          Y2    *     (M)
                                              (DEG)            (G/MI)   (M)   (M)       (VEH)

     ------------------------------------------*-------------------------------------------------*------------------------
     ---------------------------------
      1. Hart EB TL                            *  235870.27    848335.69   235946.16    848348.19 *      77.    81. AG
      219.   8.5   0.0    9.4
      2. Hart EB TL QUEUE                      *  235946.16    848348.19   235909.78    848342.19 *      37.   261. AG
      94. 100.0   0.0    3.4 0.63   6.1
      3. Hart EB RL                            *  235910.48    848343.12   235945.62    848345.50 *      35.    86. AG
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 344.   8.5   0.0    9.0
 4. Hart EB RL QUEUE                  *  235945.62    848345.50   235902.16    848342.56 *      44.   266. AG
 71. 100.0   0.0    3.0 0.49   7.3
 5. Hart WB LT                        *  236039.62    848367.12   235970.39    848354.56 *      70.   260. AG
 254.   8.5   0.0    9.4
 6. Hart WB LT QUEUE                  *  235970.39    848354.56   236012.45    848362.19 *      43.    80. AG
 94. 100.0   0.0    3.4 0.74   7.1
 7. Hart WB RL                        *  236019.66    848365.25   235969.06    848357.75 *      51.   262. AG
 176.   8.5   0.0    9.0
 8. Hart WB RL QUEUE                  *  235969.06    848357.75   235993.44    848361.38 *      25.    82. AG
 78. 100.0   0.0    3.0 0.30   4.1
 9. 140 NB L                          *  235982.64    848282.94   235962.94    848336.75 *      57.   340. AG
 237.   8.5   0.0    9.4
10. 140 NB L QUEUE                    *  235962.94    848336.75   236036.09    848136.94 *     213.   160. AG
104. 100.0   0.0    3.4 1.27  35.5
11. 140 NB TRL                        *  235983.98    848285.06   235965.06    848337.00 *      55.   340. AG
843.   8.5   0.0    9.0
12. 140 NB TRL QUEUE                  *  235965.06    848337.00   236431.75    847056.00 *    1363.   160. AG
88. 100.0   0.0    3.0 1.89 227.2
13. 140 SB LL                         *  235919.00    848421.94   235949.36    848359.12 *      70.   154. AG
121.   8.5   0.0    9.4
14. 140 SB LL QUEUE                   *  235949.36    848359.12   235866.44    848530.69 *     191.   334. AG
112. 100.0   0.0    3.4 1.70  31.8
15. 140 SB TR                         *  235919.53    848419.00   235945.62    848359.38 *      65.   156. AG
840.   8.5   0.0    9.4
16. 140 SB TR QUEUE                   *  235945.62    848359.38   235257.17    849932.50 *    1717.   336. AG
95. 100.0   0.0    3.4 2.54 286.2
17. Hart EB OUTBOUND                  *  235965.73    848350.19   236039.41    848363.12 *      75.    80. AG
443.   8.5   0.0    9.4
18. Hart WB OUTBOUND                  *  235941.72    848352.06   235869.94    848338.81 *      73.   260. AG
393.   8.5   0.0    9.4
19. 140 NB OUTBOUND                   *  235952.52    848359.88   235923.64    848423.31 *      70.   336. AG
916.   8.5   0.0    9.4
20. 140 SB OUTBOUND                   *  235956.02    848338.31   235978.42    848283.25 *      59.   158. AG
1282.   8.5   0.0    9.4
21. EBL                               *  235946.53    848348.12   235953.55    848359.31 *      13.    32. AG
61.   9.4   0.0    9.0
22. EBT                               *  235946.27    848348.31   235965.38    848350.44 *      19.    84. AG
158.   8.5   0.0    9.0
23. EBR                               *  235944.44    848346.44   235956.19    848338.50 *      14.   124. AG
```

344. 10.3 0.0 9.0
24. WBL * 235969.30 848354.88 235956.00 848339.56 * 20. 221. AG
133. 9.4 0.0 9.0
25. WBT * 235969.11 848354.62 235942.53 848351.69 * 27. 264. AG
121. 8.5 0.0 9.0
26. WBR * 235967.92 848357.19 235952.72 848359.31 * 15. 278. AG
176. 10.3 0.0 9.0
27. NBL * 235962.92 848337.50 235942.34 848352.00 * 25. 305. AG
237. 9.4 0.0 9.0
28. NBT * 235964.83 848337.69 235952.81 848359.44 * 25. 331. AG
679. 8.5 0.0 9.0
29. NBR * 235964.45 848338.56 235967.66 848350.31 * 12. 15. AG
164. 10.3 0.0 9.0
30. SBL * 235949.27 848359.25 235965.19 848350.25 * 18. 119. AG
121. 9.4 0.0 9.0
31. SBT * 235945.70 848359.44 235956.09 848338.94 * 23. 153. AG
805. 8.5 0.0 9.0
32. SBR * 235946.34 848359.62 235939.53 848350.81 * 11. 218. AG
35. 10.3 0.0 9.0

FF

JOB: First Light - Taunton - Hart & County Sts- 2022 Build A Sat RUN: CAL3QHC
RUN

DATE : 12/11/12
TIME : 11:31:48

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Hart EB TL QUEUE	*	132	101	5.0	219	1900	45.89	2	3
4. Hart EB RL QUEUE	*	132	76	5.0	344	1900	45.89	2	3
6. Hart WB LT QUEUE	*	132	101	5.0	254	1900	45.89	2	3
8. Hart WB RL QUEUE	*	132	84	5.0	176	1900	45.89	2	3
10. 140 NB L QUEUE	*	132	112	5.0	237	1900	45.89	2	3

12. 140 NB TRL QUEUE	*	132	94	5.0	843	1900	45.89	2	3
14. 140 SB LL QUEUE	*	132	120	5.0	121	1900	45.89	2	3
16. 140 SB TR QUEUE	*	132	102	5.0	840	1900	45.89	2	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235961.95	848360.62	1.8	*
2. LR_2	*	235956.00	848363.88	1.8	*
3. LR_3	*	235953.88	848368.38	1.8	*
4. LR_4	*	235951.77	848372.94	1.8	*
5. LR_5	*	235949.66	848377.50	1.8	*
6. LR_6	*	235947.55	848382.00	1.8	*
7. LR_7	*	235945.42	848386.50	1.8	*
8. LR_8	*	235943.31	848391.06	1.8	*
9. LR_9	*	235941.19	848395.56	1.8	*
10. LR_10	*	235939.06	848400.12	1.8	*
11. LR_11	*	235936.95	848404.62	1.8	*
12. LR_12	*	235934.84	848409.19	1.8	*
13. LR_13	*	235932.73	848413.69	1.8	*
14. LR_14	*	235930.61	848418.25	1.8	*
15. LR_15	*	235928.50	848422.75	1.8	*
16. LR_16	*	235913.59	848419.25	1.8	*
17. LR_17	*	235915.72	848414.69	1.8	*
18. LR_18	*	235917.83	848410.19	1.8	*
19. LR_19	*	235919.95	848405.62	1.8	*
20. LR_20	*	235922.06	848401.12	1.8	*
21. LR_21	*	235924.19	848396.56	1.8	*
22. LR_22	*	235926.30	848392.06	1.8	*
23. LR_23	*	235928.41	848387.50	1.8	*
24. LR_24	*	235930.52	848383.00	1.8	*
25. LR_25	*	235932.64	848378.50	1.8	*
26. LR_26	*	235934.75	848373.94	1.8	*
27. LR_27	*	235936.88	848369.44	1.8	*
28. LR_28	*	235938.98	848364.88	1.8	*
29. LR_29	*	235941.09	848360.31	1.8	*
30. LR_31	*	235969.44	848342.38	1.8	*
31. LR_32	*	235970.98	848345.12	1.8	*

32. LR_33	*	235975.58	848347.31	1.8 *
33. LR_34	*	235980.50	848348.19	1.8 *
34. LR_35	*	235985.42	848349.12	1.8 *
35. LR_36	*	235990.34	848350.00	1.8 *
36. LR_37	*	235995.27	848350.94	1.8 *

FF

JOB: First Light - Taunton - Hart & County Sts- 2022 Build A Sat RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
37. LR_38	*	236000.19	848351.81	1.8 *
38. LR_39	*	236005.09	848352.69	1.8 *
39. LR_40	*	236010.02	848353.62	1.8 *
40. LR_41	*	236014.94	848354.50	1.8 *
41. LR_42	*	236019.84	848355.38	1.8 *
42. LR_43	*	236024.77	848356.31	1.8 *
43. LR_44	*	236029.69	848357.19	1.8 *
44. LR_45	*	236034.61	848358.12	1.8 *
45. LR_46	*	236039.53	848359.00	1.8 *
46. LR_47	*	236041.47	848373.19	1.8 *
47. LR_48	*	236036.55	848372.31	1.8 *
48. LR_49	*	236031.62	848371.44	1.8 *
49. LR_50	*	236026.70	848370.50	1.8 *
50. LR_51	*	236021.80	848369.62	1.8 *
51. LR_52	*	236016.88	848368.69	1.8 *
52. LR_53	*	236011.95	848367.81	1.8 *
53. LR_54	*	236007.05	848366.94	1.8 *
54. LR_55	*	236002.12	848366.00	1.8 *
55. LR_56	*	235997.20	848365.12	1.8 *
56. LR_57	*	235992.28	848364.25	1.8 *
57. LR_58	*	235987.38	848363.31	1.8 *
58. LR_59	*	235982.45	848362.44	1.8 *
59. LR_60	*	235977.53	848361.50	1.8 *
60. LR_61	*	235972.61	848360.62	1.8 *
61. LR_62	*	235967.69	848359.75	1.8 *
62. LR_64	*	235938.45	848355.44	1.8 *
63. LR_65	*	235933.53	848354.56	1.8 *
64. LR_66	*	235928.59	848353.69	1.8 *

65. LR_67	*	235923.69	848352.88	1.8 *
66. LR_68	*	235918.75	848352.00	1.8 *
67. LR_69	*	235913.83	848351.12	1.8 *
68. LR_70	*	235908.91	848350.25	1.8 *
69. LR_71	*	235903.97	848349.44	1.8 *
70. LR_72	*	235899.05	848348.56	1.8 *
71. LR_73	*	235894.12	848347.69	1.8 *
72. LR_74	*	235889.20	848346.88	1.8 *
73. LR_75	*	235884.27	848346.00	1.8 *
74. LR_76	*	235879.34	848345.12	1.8 *
75. LR_77	*	235874.42	848344.25	1.8 *
76. LR_78	*	235869.48	848343.44	1.8 *
77. LR_79	*	235871.02	848332.75	1.8 *
78. LR_80	*	235875.95	848333.56	1.8 *
79. LR_81	*	235880.88	848334.44	1.8 *
80. LR_82	*	235885.80	848335.31	1.8 *
81. LR_83	*	235890.73	848336.12	1.8 *
82. LR_84	*	235895.66	848337.00	1.8 *
83. LR_85	*	235900.58	848337.88	1.8 *
84. LR_86	*	235905.50	848338.75	1.8 *
85. LR_87	*	235910.44	848339.56	1.8 *
86. LR_88	*	235915.36	848340.44	1.8 *
87. LR_89	*	235920.28	848341.31	1.8 *
88. LR_90	*	235925.38	848341.50	1.8 *
89. LR_91	*	235930.12	848341.56	1.8 *
90. LR_92	*	235935.22	848341.44	1.8 *
91. LR_93	*	235940.47	848342.31	1.8 *
92. LR_94	*	235945.70	848340.75	1.8 *
93. LR_96	*	235948.52	848339.25	1.8 *

FF

JOB: First Light - Taunton - Hart & County Sts- 2022 Build A Sat RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
94. LR_97	*	235952.20	848335.62	1.8 *
95. LR_98	*	235954.11	848331.00	1.8 *
96. LR_99	*	235956.02	848326.38	1.8 *
97. LR_100	*	235957.94	848321.75	1.8 *

98.	LR_101	*	235959.84	848317.12	1.8 *
99.	LR_102	*	235961.77	848312.50	1.8 *
**.	LR_103	*	235963.67	848307.88	1.8 *
**.	LR_104	*	235965.58	848303.25	1.8 *
**.	LR_105	*	235967.50	848298.69	1.8 *
**.	LR_106	*	235969.41	848294.06	1.8 *
**.	LR_107	*	235971.31	848289.44	1.8 *
**.	LR_108	*	235973.23	848284.81	1.8 *
**.	LR_109	*	235988.36	848288.12	1.8 *
**.	LR_110	*	235986.45	848292.75	1.8 *
**.	LR_111	*	235984.55	848297.38	1.8 *
**.	LR_112	*	235982.62	848302.00	1.8 *
**.	LR_113	*	235980.70	848306.62	1.8 *
**.	LR_114	*	235978.80	848311.25	1.8 *
**.	LR_115	*	235976.89	848315.88	1.8 *
**.	LR_116	*	235974.98	848320.50	1.8 *
**.	LR_117	*	235973.06	848325.12	1.8 *
**.	LR_118	*	235971.16	848329.75	1.8 *
**.	LR_119	*	235969.23	848334.38	1.8 *
**.	LR_120	*	235967.33	848339.00	1.8 *

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	*	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.8	0.8	1.	1.1	1.2

```
  10.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
  0.7    0.9     1.    1.1
  20.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
  0.7    0.9    1.1    1.1
  30.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
  0.7    0.9    1.1    1.1
  40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.5
  0.8     1.     1.     1.
  50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.5
  0.8     1.     1.     1.
  60.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
  0.9    0.9    0.9     1.
  70.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.6
  0.9    0.9    0.9     1.
  80.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.7
  0.9     1.     1.     1.
  90.  *    0.7    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.8
  0.9     1.     1.     1.
 100.  *    0.7    0.4    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.
 1.1    1.1    1.1    1.1
 110.  *    0.5    0.3    0.3    0.3    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.
 1.1    1.1    1.1    1.1
 120.  *    0.4    0.4    0.3    0.3    0.3    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     1.
 1.1    1.1    1.1    1.1

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.7    0.4    0.3    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     1.
 1.1    1.1    1.1    1.2
 DEGR. *     90    100    100    110    120    120      0      0      0      0      0      0      0      0      0    100
 100    100      0      0
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
130.	*	0.3	0.3	0.2	0.3	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	1.2	1.2	1.2	1.2	1.2
140.	*	0.2	0.2	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	1.2	1.3	1.2	1.2	1.4
150.	*	0.5	0.7	0.6	0.6	0.7	0.7	0.6	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	1.3	1.3	1.3	1.3	1.3
160.	*	0.8	1.	0.9	0.9	1.	1.	1.1	1.	1.	1.	1.	1.	1.1	1.2	1.2	0.8	0.9	0.9	0.8	0.7
170.	*	0.9	1.1	1.1	0.9	1.	0.9	1.2	1.2	1.2	1.1	1.2	1.3	1.4	1.3	1.3	0.2	0.2	0.2	0.2	0.2
180.	*	0.7	0.9	0.6	0.8	0.8	1.	1.	0.9	1.	1.	1.1	1.1	1.1	1.1	1.1	0.	0.	0.	0.	0.1
190.	*	0.7	0.6	0.5	0.6	0.9	0.9	1.1	1.1	1.2	1.2	1.1	1.1	1.1	1.1	1.1	0.	0.	0.	0.	0.
200.	*	0.5	0.5	0.6	0.9	1.	1.	1.	1.	1.	0.9	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
210.	*	0.4	0.5	0.7	1.	1.1	1.1	1.	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
220.	*	0.4	0.6	1.	1.	1.2	1.	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
230.	*	0.5	0.7	1.1	1.1	1.	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.	0.	0.	0.	0.
240.	*	0.6	0.9	1.	1.	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.	0.	0.	0.	0.
250.	*	0.6	1.1	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.	0.	0.	0.	0.
260.	*	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.6	0.	0.	0.	0.	0.
270.	*	0.7	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.6	0.	0.	0.	0.	0.

```
 280.  *    0.7    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.5     0.
 0.     0.     0.     0.
 290.  *    0.6     1.     1.     1.    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.7    0.5     0.
 0.     0.     0.     0.
 300.  *    0.8    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    0.9    0.9    0.7    0.6     0.
 0.     0.     0.     0.
 310.  *    0.9    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.     1.    0.9    0.8    0.7    0.6     0.
 0.     0.     0.     0.
 320.  *    0.8    1.2    1.2    1.1    1.2    1.2    1.1    1.1    1.1    1.1    1.1    0.9    0.9    0.8    0.7    0.2
 0.2    0.2    0.2    0.3
 330.  *    0.7    1.1    1.1    1.1    1.1    1.1    1.1     1.     1.    0.8    0.8    0.8    0.7    0.7    0.6    0.4
 0.5    0.6    0.6    0.6
 340.  *    0.3    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.4    0.3    0.7
 0.7    0.8    0.9    0.9
 350.  *     0.    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.8
 0.8    0.9     1.    1.2
 360.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.    0.8
 0.8     1.    1.1    1.2

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.9    1.2    1.2    1.1    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.3    1.4    1.3    1.3    1.3
 1.3    1.3    1.3    1.4
 DEGR. *    170    320    320    230    220    320    170    170    170    190    170    170    170    170    170    150
 140    150    150    140
```

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC21	REC22	REC23	REC24	REC25	REC26	REC27	REC28	REC29	REC30	REC31	REC32	REC33	REC34	REC35	REC36

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 REC37  REC38  REC39  REC40

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *    1.1    1.2    1.3    1.3    1.3    1.3    1.3    1.3    1.3    0.3    0.3    0.5    0.5    0.5    0.5    0.4
   0.4    0.4    0.4    0.2
  10.  *    1.1    1.1    1.1    1.1    1.2    1.3    1.3    1.3    1.3    0.3    0.3    0.5    0.5    0.5    0.5    0.4
  0.4    0.4    0.3    0.2
  20.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    0.3    0.5    0.5    0.5    0.5    0.4    0.4
  0.4    0.4    0.3    0.2
  30.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    0.4    0.5    0.5    0.5    0.5    0.4    0.4
  0.4    0.3    0.3    0.2
  40.  *     1.     1.     1.    0.9    0.9    0.9    0.9     1.     1.    0.5    0.6    0.6    0.6    0.5    0.5    0.5
  0.5    0.4    0.3    0.3
  50.  *     1.     1.    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.5    0.6    0.6    0.6    0.5    0.5    0.5
  0.4    0.4    0.3    0.3
  60.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.3    0.6    0.5    0.5    0.5    0.4    0.4
  0.4    0.3    0.3    0.3
  70.  *    0.9     1.     1.     1.    0.9    0.9    0.9    0.9    0.9    0.2    0.4    0.4    0.4    0.4    0.4    0.4
  0.3    0.2    0.2    0.2
  80.  *     1.    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.1    0.2    0.3    0.3    0.2    0.2    0.2
  0.2    0.2    0.2    0.1
  90.  *     1.     1.     1.    0.9    0.9    0.9    0.9     1.    1.2     0.    0.1    0.1    0.1    0.1    0.1    0.1
  0.1    0.1    0.1    0.1
 100.  *    1.1    1.1    1.1    1.1    1.1    1.2    1.2    1.2    1.1     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 110.  *    1.1    1.1    1.1    1.2    1.2    1.2    1.3    1.3    0.7     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 120.  *    1.1    1.1    1.2    1.2    1.2    1.1    1.1    0.9    0.5     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 130.  *    1.2    1.2    1.2    1.2    1.2    1.1    1.1    1.1    0.9     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 140.  *    1.4    1.5    1.3    1.5    1.5    1.4    1.2     1.    1.1     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 150.  *    1.3    1.3    1.2    1.2    1.1    1.1     1.    1.2    1.2    0.3    0.2    0.1     0.     0.     0.     0.
 0.     0.     0.     0.
 160.  *    0.7    0.7    0.7    0.7    0.8    0.8    0.8    0.6     1.    0.8    0.6    0.3    0.2    0.2    0.1    0.1
 0.1    0.1    0.1    0.1
 170.  *    0.2    0.2    0.2    0.2    0.3    0.4    0.5    0.6    0.6    1.2    0.8    0.6    0.4    0.2    0.2    0.2
 0.2    0.2    0.1    0.1
```

```
180.  *    0.2    0.2    0.2    0.3    0.3    0.3    0.4    0.4    0.3    1.2     1.    0.7    0.6    0.4    0.2    0.2
0.2    0.2    0.2    0.2
190.  *     0.     0.    0.1    0.2    0.2    0.2    0.3    0.3    0.4    1.2    0.9    0.8    0.5    0.4    0.4    0.4
0.2    0.2    0.2    0.2
200.  *     0.     0.     0.    0.1    0.2    0.3    0.3    0.3    0.4     1.    0.8    0.7    0.5    0.4    0.4    0.4
0.4    0.3    0.2    0.2
210.  *     0.     0.     0.     0.    0.1    0.3    0.3    0.3    0.4    0.7    0.6    0.5    0.5    0.4    0.4    0.4
0.4    0.4    0.4    0.3
220.  *     0.     0.     0.     0.     0.    0.1    0.3    0.3    0.5    0.6    0.6    0.5    0.5    0.4    0.4    0.4
0.4    0.4    0.4    0.4
230.  *     0.     0.     0.     0.     0.    0.1    0.1    0.3    0.4    0.6    0.5    0.5    0.4    0.4    0.4    0.4
0.4    0.4    0.4    0.4
240.  *     0.     0.     0.     0.     0.     0.    0.1    0.1    0.3    0.4    0.3    0.2    0.2    0.3    0.3    0.3
0.3    0.3    0.4    0.3
250.  *     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.6    0.4    0.3    0.3    0.3    0.2    0.2
0.2    0.2    0.2    0.2
260.  *     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.8    0.6    0.5    0.5    0.5    0.4    0.3
0.2    0.3    0.3    0.3
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.9    0.8    0.6    0.5    0.5    0.6    0.5
0.3    0.4    0.5    0.6
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.8    0.7    0.4    0.4    0.5    0.4    0.5
0.6    0.7    0.7    0.6
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.6    0.4    0.6    0.8    0.7     1.     1.
1.     1.     1.    0.9
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.7    0.8    0.6    0.7     1.     1.     1.
1.     1.    0.9    0.8
310.  *     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.8    0.7    0.6    0.7    0.9    0.9    0.9
0.8    0.8    0.7    0.7
320.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.4     1.    0.9    0.8    0.9    0.8    0.8    0.7
0.7    0.6    0.6    0.6
330.  *    0.7    0.7    0.7    0.7    0.7    0.8    0.8    0.8    0.9    0.9    0.7    0.7    0.8    0.7    0.7    0.6
0.5    0.5    0.5    0.4
340.  *    0.9    1.1    1.1    1.2    1.3    1.3    1.3    1.3    1.3    0.5    0.4    0.7    0.6    0.6    0.6    0.6
0.5    0.4    0.4    0.3
350.  *    1.2    1.2    1.4    1.4    1.5    1.5    1.5    1.5    1.6    0.1    0.3    0.5    0.5    0.5    0.5    0.5
0.4    0.4    0.4    0.3
360.  *    1.1    1.2    1.3    1.3    1.3    1.3    1.3    1.3    1.3    0.3    0.3    0.5    0.5    0.5    0.5    0.4
0.4    0.4    0.4    0.2

------*-----------------------------------------------------------------------------------------------------------------
```

```
 ---------------------
MAX   *    1.4    1.5    1.4    1.5    1.5    1.5    1.5    1.5    1.6    1.2     1.    0.8    0.9     1.     1.     1.
1.     1.     1.    0.9
DEGR. *    140    140    350    140    140    350    350    350    350    170    180    190    320    300    290    290
290    290    290    290
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

```
WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC41  REC42  REC43  REC44  REC45  REC46  REC47  REC48  REC49  REC50  REC51  REC52  REC53  REC54  REC55  REC56
REC57  REC58  REC59  REC60

------*-----------------------------------------------------------------------------------------------------------------
---------------------
   .  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.     0.     0.     0.
 10.  *    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 20.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 30.  *    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 40.  *    0.3    0.3    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 50.  *    0.3    0.3    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 60.  *    0.2    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 70.  *    0.2    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1
 0.1    0.1    0.2    0.2
```

```
  80.   *    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.2    0.2    0.3
  0.3    0.4    0.6    0.6
  90.   *    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.3    0.3    0.4    0.4
  0.6    0.7    0.8    0.8
 100.   *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.2    0.2    0.3    0.4    0.5    0.5
 0.6    0.9    0.9     1.
 110.   *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.3    0.4    0.5    0.5
 0.8    0.9     1.     1.
 120.   *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.3    0.4    0.5    0.5    0.6
 0.8    0.9    0.9    0.9
 130.   *     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.3    0.4    0.5    0.5    0.5
 0.8    0.8    0.8    0.8
 140.   *     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.3    0.5    0.5    0.5    0.5
 0.8    0.8    0.8    0.8
 150.   *     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.2    0.3    0.5    0.5    0.5    0.5
 0.6    0.7    0.7    0.8
 160.   *    0.1     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.2    0.2    0.4    0.5    0.5    0.5    0.6
 0.7    0.9    0.9     1.
 170.   *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.3    0.5    0.5    0.6    0.6    0.8
 0.8    0.9    1.1    1.3
 180.   *    0.2    0.2    0.1    0.1    0.1    0.1    0.3    0.3    0.3    0.4    0.5    0.6    0.6    0.6    0.6    0.8
 0.9    1.1    1.2    1.3
 190.   *    0.2    0.2    0.2    0.2    0.2    0.2    0.4    0.4    0.4    0.4    0.5    0.7    0.7    0.7    0.6     1.
 1.1    1.1    1.1    1.2
 200.   *    0.2    0.2    0.2    0.2    0.2    0.2    0.4    0.4    0.4    0.4    0.6    0.7    0.8    0.9    0.9    1.2
 1.2    1.1    1.1    1.1
 210.   *    0.2    0.2    0.2    0.1    0.1    0.3    0.3    0.3    0.3    0.5    0.7    0.9    0.9     1.    1.1    1.2
 1.2    1.2    1.1    0.7
 220.   *    0.4    0.3    0.2    0.1    0.1    0.3    0.4    0.4    0.4    0.5    0.8     1.     1.     1.    1.1    1.2
 1.1    0.9     1.    0.5
 230.   *    0.3    0.3    0.2    0.2    0.2    0.3    0.3    0.4    0.4    0.5    0.6    0.7    0.7    0.8    0.9     1.
 1.     1.    0.8    0.4
 240.   *    0.3    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.5    0.6    0.7    0.7    0.7    0.7    0.9
 1.    0.9    0.8    0.6
 250.   *    0.2    0.2    0.2    0.1    0.1    0.3    0.3    0.3    0.5    0.6    0.6    0.6    0.6    0.7    0.7    0.9
 0.9    0.8    0.7    0.7
 260.   *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.4
 0.4    0.5    0.4    0.6
 270.   *    0.6    0.6    0.4    0.4    0.4     0.     0.     0.     0.1    0.1    0.2    0.3    0.3    0.4    0.4    0.4
 0.5    0.6    0.5    0.5
```

```
 280.  *    0.6    0.6    0.4    0.4    0.4    0.1    0.1    0.1    0.2    0.2    0.3    0.4    0.4    0.4    0.4    0.4
 0.4    0.4    0.4    0.4
 290.  *    0.8    0.7    0.7    0.6    0.4    0.1    0.1    0.2    0.2    0.2    0.3    0.3    0.4    0.4    0.4    0.4
 0.4    0.4    0.4    0.4
 300.  *    0.7    0.6    0.5    0.5    0.5    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.4    0.4
 0.4    0.4    0.4    0.6
 310.  *    0.6    0.5    0.5    0.5    0.4    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.3
 0.3    0.4    0.4    0.5
 320.  *    0.4    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.2
 0.2    0.3    0.3    0.6
 330.  *    0.3    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.2    0.2    0.4
 340.  *    0.2    0.2    0.2    0.2    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 350.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 360.  *    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.8    0.7    0.7    0.6    0.5    0.3    0.4    0.4    0.5    0.6    0.8     1.     1.     1.     1.1    1.2
 1.2    1.2    1.2    1.3
 DEGR. *    290    290    290    290    300    210    190    190    250    250    220    220    220    210    210    200
 200    210    180    170
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	REC61	REC62	REC63	REC64	REC65	REC66	REC67	REC68	REC69	REC70	REC71	REC72	REC73	REC74	REC75	REC76

```
 REC77  REC78  REC79  REC80

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *     0.     1.    0.7    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1
   0.2    0.3    0.4    0.4
  10.  *     0.    0.9    0.7    0.5    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2
  0.4    0.4    0.4    0.4
  20.  *     0.    0.8    0.7    0.4    0.4    0.4    0.4    0.4    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.2
  0.4    0.4    0.4    0.4
  30.  *     0.    0.8    0.7    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.2    0.2    0.2    0.2    0.2
  0.4    0.4    0.4    0.4
  40.  *     0.    0.8    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.2    0.2    0.2
  0.3    0.4    0.4    0.6
  50.  *     0.    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.1    0.1
  0.3    0.3    0.4    0.5
  60.  *     0.    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.2    0.1    0.1
  0.3    0.3    0.4    0.5
  70.  *    0.3    0.5    0.6    0.6    0.5    0.5    0.5    0.5    0.3    0.2    0.2    0.1    0.1    0.1    0.1    0.1
  0.5    0.4    0.4    0.4
  80.  *    0.7    0.7    0.4    0.3    0.3    0.3    0.1    0.2    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.4
  0.4    0.4    0.4    0.4
  90.  *    0.9    0.6    0.5    0.5    0.6    0.6    0.5    0.6    0.5    0.5    0.6    0.5    0.5    0.5    0.5    0.5
  0.1    0.1    0.3    0.3
 100.  *     1.    0.5    0.3    0.4    0.5    0.6    0.8    0.7    0.8    0.8    0.9    0.6    0.6    0.6    0.6    0.5
 0.2    0.2    0.2    0.2
 110.  *    0.9    0.4    0.5    0.6    0.9    0.8    0.9     1.     1.     1.    0.8    0.7    0.6    0.5    0.5    0.5
 0.2    0.2    0.2    0.2
 120.  *    0.9    0.8     1.    1.1     1.     1.    1.1    1.1    1.1    0.8    0.7    0.6    0.5    0.4    0.3    0.3
 0.1    0.1    0.1    0.2
 130.  *    0.6    1.1    1.1    1.1     1.     1.    1.1     1.     1.    0.8    0.5    0.4    0.4    0.4    0.4    0.4
 0.2    0.2    0.2    0.2
 140.  *    0.6    1.1    1.1    1.1    0.9    0.9    0.9    0.8    0.7    0.5    0.4    0.4    0.4    0.3    0.3    0.3
 0.1    0.1    0.1    0.1
 150.  *    0.5    1.3    0.8    0.9    0.9    0.8    0.8    0.8    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.2
 0.1    0.1    0.1    0.1
 160.  *    0.8    0.8    0.8    0.8    0.7    0.7    0.7    0.6    0.4    0.4    0.2    0.2    0.2    0.2    0.2    0.1
 0.     0.     0.     0.
 170.  *    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1
 0.     0.     0.     0.
```

```
 180.  *    0.9    0.6    0.6    0.6    0.6    0.6    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.
 0.     0.     0.     0.
 190.  *    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.1    0.
 0.     0.     0.     0.
 200.  *    0.4    0.6    0.6    0.6    0.6    0.6    0.4    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.1    0.
 0.     0.     0.     0.
 210.  *    0.4    0.6    0.6    0.6    0.6    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.
 0.     0.     0.     0.
 220.  *    0.3    0.7    0.7    0.7    0.7    0.6    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.1    0.1    0.
 0.     0.     0.     0.
 230.  *    0.3    0.7    0.7    0.7    0.6    0.5    0.4    0.4    0.3    0.3    0.3    0.3    0.1    0.1    0.1    0.
 0.     0.     0.     0.
 240.  *    0.5    0.7    0.6    0.6    0.5    0.4    0.4    0.3    0.3    0.3    0.3    0.2    0.1    0.1    0.1    0.
 0.     0.     0.     0.
 250.  *    0.6    0.5    0.5    0.5    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.
 0.     0.     0.    0.1
 260.  *    0.6    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.
 0.     0.    0.1    0.1
 270.  *    0.7    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.
 0.     0.    0.1    0.2
 280.  *    0.5    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 290.  *    0.7     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 300.  *    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.2    0.2
 310.  *    0.6     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 320.  *    0.7     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 330.  *    0.4    0.4    0.2    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 340.  *    0.2    0.8    0.5    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.3    0.3    0.3
 350.  *     0.    0.9    0.6    0.6    0.3    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1
 0.2    0.3    0.3    0.3
 360.  *     0.     1.    0.7    0.6    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1
 0.2    0.3    0.4    0.4

------*-----------------------------------------------------------------------------------------------------------
```

```
 ---------------------
MAX   *     1.    1.3    1.1    1.1     1.     1.    1.1    1.1    1.1     1.    0.9    0.7    0.6    0.6    0.6    0.5
0.5    0.4    0.4    0.6
DEGR. *    100    150    130    120    120    120    120    120    120    110    100    110    100    100    100     90
70     10      0     40
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

```
WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC81  REC82  REC83  REC84  REC85  REC86  REC87  REC88  REC89  REC90  REC91  REC92  REC93  REC94  REC95  REC96
REC97  REC98  REC99  REC100

------*-----------------------------------------------------------------------------------------------------------------
---------------------
   .  *    0.4    0.4    0.4    0.6    0.8     1.    1.1    1.2    1.2    1.3    1.4    1.1     1.     1.     1.    0.8
  0.9    0.8    0.9     1.
 10.  *    0.4    0.4    0.5    0.6    1.1    1.2    1.2    1.2    1.2    1.2    1.2    0.9    0.7    0.8    0.7    0.6
 0.7    0.9    0.9    1.1
 20.  *    0.4    0.4    0.6    0.8    1.2    1.2    1.2    1.2    1.2    1.1    1.1    0.7    0.6    0.6    0.6    0.5
 0.9    0.9    1.2    1.2
 30.  *    0.5    0.6    0.7    0.9    1.3    1.3    1.4    1.3    1.2    1.2     1.    0.5    0.5    0.6    0.5    0.8
 0.9    1.1    1.1    1.1
 40.  *    0.6    0.7    0.8    0.9    1.3    1.4    1.4    1.4    1.4     1.    0.9    0.5    0.5    0.8    0.8     1.
 1.    1.1    1.1     1.
 50.  *    0.7    0.7    0.9    1.1    1.4    1.5    1.5    1.3    1.2    0.8    0.8    0.5    0.7    0.9    0.8     1.
 1.1     1.     1.     1.
 60.  *    0.5    0.5    0.7    0.9    1.1    1.2    1.3    1.1     1.    0.9    0.9    0.8    0.8    0.8     1.     1.
 0.9     1.     1.     1.
 70.  *    0.4    0.7    0.7     1.    1.3    1.3    1.3    1.2     1.    0.9    0.9    0.7    0.7    0.6    0.8    0.9
 1.     1.     1.     1.
```

```
 80.  *    0.5    0.7    0.7    0.8     1.    0.9    1.2     1.    0.9    0.7    0.7    0.7    0.8    0.6    0.8    0.9
 1.     1.     1.     1.
 90.  *    0.3    0.3    0.4    0.6    0.6    0.6    0.8    0.6    0.6    0.5    0.5    0.5    0.5    0.6    0.9     1.
 1.     1.     1.     1.
100.  *    0.2    0.2    0.3    0.4    0.5    0.6    0.6    0.4    0.4    0.6    0.7    0.8    0.8    0.8     1.     1.
1.     1.     1.     1.
110.  *    0.2    0.3    0.3    0.4    0.4    0.5    0.5    0.5    0.4    0.5    0.7    0.7    0.8    0.9     1.     1.
1.     1.     1.     1.
120.  *    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.5    0.5    0.5    0.6    0.7    0.8    1.2    1.2    1.2
1.2    1.2    1.2    1.2
130.  *    0.2    0.2    0.2    0.3    0.3    0.3    0.4    0.4    0.5    0.5    0.7    0.8    1.2    1.3    1.3    1.3
1.3    1.3    1.2    1.2
140.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.5    0.7    0.9     1.    1.4    1.4    1.4
1.3    1.3    1.3    1.2
150.  *    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.3    0.3    0.6    0.8    0.9    1.1    1.2    1.2
1.2    1.2    1.1    1.1
160.  *     0.     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.4    0.5     1.    0.9    0.9
0.8    0.8    0.8    0.8
170.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.4    0.4    0.4
0.4    0.4    0.4    0.4
180.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1
0.1    0.1    0.1    0.1
190.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1
0.1    0.1    0.1    0.1
200.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
210.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
240.  *     0.     0.     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
250.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.2    0.1    0.2     0.     0.     0.     0.     0.
0.     0.     0.     0.
260.  *    0.1    0.2    0.2    0.2    0.2    0.5    0.5    0.5    0.5    0.5    0.5    0.3     0.     0.     0.     0.
0.     0.     0.     0.
270.  *    0.2    0.2    0.2    0.2    0.2    0.5    0.8    0.7    0.7    0.7    0.9    0.6    0.5    0.2     0.     0.
0.     0.     0.     0.
```

```
280.  *    0.2    0.2    0.2    0.2    0.3    0.7     1.    0.9    0.9     1.     1.    0.7    0.7    0.4    0.2     0.
0.     0.     0.     0.
290.  *    0.2    0.2    0.2    0.2    0.3    0.9     1.     1.    0.9     1.     1.    0.7    0.7    0.4    0.3    0.2
0.     0.     0.     0.
300.  *    0.2    0.2    0.2    0.2    0.4    0.9     1.     1.    0.9    0.9    0.9    0.7    0.8    0.6    0.4    0.2
0.2    0.2    0.1    0.1
310.  *    0.2    0.2    0.2    0.3    0.4    0.9     1.    0.9    0.9    0.8    0.9    0.8    0.8    0.5    0.3    0.3
0.3    0.3    0.3    0.2
320.  *    0.2    0.2    0.2    0.3    0.4    0.8    0.9    0.9    0.8    0.8    0.8    0.8    0.7    0.6    0.5    0.4
0.4    0.3    0.2    0.2
330.  *    0.2    0.2    0.2    0.3    0.5    0.8    0.9    0.9    0.9    0.9    0.9    1.2    0.8     1.    0.9     1.
0.9    0.8    0.7    0.6
340.  *    0.3    0.3    0.3    0.5    0.6    0.9     1.     1.    1.1    1.1    1.3    1.4    1.3    1.1    1.2    1.1
1.    1.1     1.    1.1
350.  *    0.3    0.3    0.4    0.6    0.8     1.     1.    1.1    1.2    1.3    1.4    1.6    1.3    1.2    1.3    1.2
1.    1.1    1.2    1.3
360.  *    0.4    0.4    0.4    0.6    0.8     1.    1.1    1.2    1.2    1.3    1.4    1.1     1.     1.     1.    0.8
0.9    0.8    0.9     1.

------*-----------------------------------------------------------------------------------------------------------
---------------------
MAX   *    0.7    0.7    0.9    1.1    1.4    1.5    1.5    1.4    1.4    1.3    1.4    1.6    1.3    1.4    1.4    1.4
1.3    1.3    1.3    1.3
DEGR. *     50     40     50     50     50     50     50     40     40      0      0    350    340    140    140    140
130    130    140    350
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC101	REC102	REC103	REC104	REC105	REC106	REC107	REC108	REC109	REC110	REC111	REC112	REC113	REC114	REC115	REC116

REC117

.	*	1.1	1.2	1.2	1.2	1.3	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3
10.	*	1.1	1.2	1.2	1.2	1.3	0.	0.	0.	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.3	0.5
20.	*	1.3	1.3	1.2	1.2	1.2	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.4
30.	*	1.1	1.	1.1	1.1	1.1	0.	0.	0.	0.	0.	0.	0.1	0.1	0.2	0.3	0.3	0.3
40.	*	1.	1.	1.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.3	0.3
50.	*	1.	1.	1.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.4
60.	*	1.	1.	1.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2
70.	*	1.	1.	1.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2
80.	*	1.	1.	1.	1.	0.8	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90.	*	1.	1.	1.	1.	0.7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100.	*	1.	1.	1.	0.9	0.6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
110.	*	1.1	1.1	1.1	0.9	0.6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
120.	*	1.2	1.2	1.1	0.9	0.6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.
130.	*	1.2	1.1	1.	0.8	0.7	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1
140.	*	1.1	1.1	0.9	0.8	0.6	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3
150.	*	1.	0.9	0.9	0.8	0.6	0.2	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.7
160.	*	0.8	0.7	0.7	0.6	0.5	0.5	0.6	0.6	0.7	0.9	1.	1.1	1.3	1.3	1.3	1.3	1.4
170.	*	0.4	0.4	0.4	0.3	0.2	0.7	0.8	0.9	1.	1.2	1.3	1.4	1.5	1.6	1.7	1.7	1.6
180.	*	0.1	0.1	0.1	0.1	0.	0.6	0.7	0.8	1.1	1.2	1.5	1.5	1.5	1.6	1.6	1.6	1.7
190.	*	0.1	0.1	0.1	0.1	0.	0.6	0.8	1.1	1.2	1.2	1.2	1.4	1.4	1.5	1.5	1.6	1.5
200.	*	0.	0.	0.	0.	0.	0.6	0.8	1.1	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
210.	*	0.	0.	0.	0.	0.	0.5	0.7	1.	1.1	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.1
220.	*	0.	0.	0.	0.	0.	0.5	0.8	0.9	1.	1.1	1.1	1.2	1.3	1.3	1.3	1.3	1.
230.	*	0.	0.	0.	0.	0.	0.6	0.9	0.9	1.	1.	1.	1.	1.1	1.2	1.2	1.2	0.8
240.	*	0.	0.	0.	0.	0.	0.6	0.9	1.	1.	1.	1.	1.	1.	1.2	1.2	1.2	0.7
250.	*	0.	0.	0.	0.	0.	0.9	1.	1.1	1.1	1.1	1.1	1.	1.	1.1	1.2	1.2	0.4
260.	*	0.	0.	0.	0.	0.	0.9	1.	1.	1.	1.	1.	1.	1.	1.2	1.2	1.1	0.5
270.	*	0.	0.	0.	0.	0.	1.	1.	1.	1.	1.	1.	1.	1.1	1.2	1.2	1.	0.8
280.	*	0.	0.	0.	0.	0.	1.	1.1	1.1	1.1	1.1	1.1	1.2	1.3	1.3	1.4	1.3	0.9
290.	*	0.	0.	0.	0.	0.	1.1	1.1	1.1	1.2	1.3	1.3	1.3	1.4	1.5	1.4	1.3	0.7
300.	*	0.1	0.1	0.1	0.1	0.1	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.1	0.8
310.	*	0.1	0.1	0.1	0.1	0.1	1.3	1.3	1.3	1.4	1.4	1.5	1.3	1.4	1.4	1.5	1.	1.
320.	*	0.3	0.2	0.2	0.2	0.2	1.6	1.6	1.6	1.5	1.5	1.7	1.8	1.6	1.6	1.1	1.1	1.1
330.	*	0.5	0.5	0.6	0.6	0.6	1.3	1.4	1.5	1.5	1.5	1.6	1.6	1.6	1.4	1.2	1.	1.1
340.	*	1.1	1.1	1.1	1.1	1.2	0.9	0.9	1.	1.	0.8	0.8	0.9	0.9	0.8	0.9	0.8	0.8
350.	*	1.2	1.2	1.2	1.3	1.4	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.2	0.3
360.	*	1.1	1.2	1.2	1.2	1.3	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3

MAX	*	1.3	1.3	1.2	1.3	1.4	1.6	1.6	1.6	1.5	1.5	1.7	1.8	1.6	1.6	1.7	1.7	1.7
DEGR.	*	20	20	0	350	350	320	320	320	320	320	320	320	320	170	170	170	180

THE HIGHEST CONCENTRATION OF 1.80 ppm OCCURRED AT RECEPTOR REC112.

FF

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*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/3/2012 5:43:25 PM
** File: F:\2975 FirstLight\Microscale\Worst\34 Dean Longmeadow & Owen LOS&ADT\2012EXAM.ou2
**
*********************************************
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: First Light-Taunton-Dean, Longmeadow & Owen EX AM RUN: CAL3QHC RUN

DATE : 12/ 3/12
TIME : 17:43:24

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE
VPH EF H W V/C QUEUE	*	X1	Y1	X2	Y2	*	(M)		
	*	(DEG)	(G/MI)	(M)	(M)	(VEH)			
1. Dean EB LL	*	235106.84	850497.38	235156.62	850512.50	*	52.	73.	AG
7. 8.7 0.0 9.0									
2. Dean EB LL QUEUE	*	235156.62	850512.50	235155.20	850512.06	*	1.	253.	AG
127. 100.0 0.0 3.0 0.47 0.2									
3. Dean EB TR	*	235066.06	850482.19	235155.91	850506.75	*	93.	75.	AG

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 973.   8.7   0.0   13.4
 4. Dean EB TR QUEUE                  *  235155.91    850506.75   235023.66    850470.62 *     137.   255. AG
 189. 100.0   0.0    7.4 1.03  22.9
 5. Dean WB LL                        *  235225.55    850536.69   235185.14    850524.44 *      42.   253. AG
 157.   8.7   0.0    9.4
 6. Dean WB LL QUEUE                  *  235185.14    850524.44   235228.31    850537.50 *      45.    73. AG
 117. 100.0   0.0    3.4 0.99   7.5
 7. Dean WB TR                        *  235275.70    850557.25   235185.14    850530.19 *      95.   253. AG
 597.   8.7   0.0   13.4
 8. Dean WB TR QUEUE                  *  235185.14    850530.19   235217.50    850539.88 *      34.    73. AG
 153. 100.0   0.0    7.4 0.41   5.6
 9. Owen NB LL                        *  235207.16    850428.06   235179.00    850508.50 *      85.   341. AG
 132.   8.7   0.0    9.7
10. Owen NB LL QUEUE                  *  235179.00    850508.50   235185.55    850489.81 *      20.   161. AG
101. 100.0   0.0    3.7 0.35   3.3
11. Owen NB T                         *  235208.59    850429.88   235181.17    850508.88 *      84.   341. AG
332.   8.7   0.0    9.7
12. Owen NB T QUEUE                   *  235181.17    850508.88   235200.36    850453.56 *      59.   161. AG
101. 100.0   0.0    3.7 0.88   9.8
13. Owen NB R                         *  235207.52    850436.38   235189.47    850493.75 *      60.   343. AG
301.   8.7   0.0    9.7
14. Owen NB R QUEUE                   *  235189.47    850493.75   235204.00    850447.56 *      48.   163. AG
101. 100.0   0.0    3.7 0.79   8.1
15. Longmeadow SB L                   *  235147.36    850577.25   235162.05    850535.25 *      44.   161. AG
103.   8.7   0.0    9.0
16. Longmeadow SB L QUEUE             *  235162.05    850535.25   235157.02    850549.88 *      15.   341. AG
101. 100.0   0.0    3.0 0.27   2.6
17. Longmeadow SB TR                  *  235134.16    850612.38   235159.88    850533.06 *      83.   162. AG
323.   8.7   0.0    9.0
18. Longmeadow SB TR QUEUE            *  235159.88    850533.06   235142.78    850585.56 *      55.   342. AG
101. 100.0   0.0    3.0 0.85   9.2
19. Dean EB OUTBOUND                  *  235195.64    850518.06   235273.02    850547.94 *      83.    69. AG
1138.   8.7   0.0   13.4
20. Dean WB OUTBOUND                  *  235156.41    850522.00   235064.98    850493.25 *      96.   253. AG
649.   8.7   0.0   13.4
21. Longmeadow NB OUTBOUND            *  235170.09    850535.00   235137.33    850611.62 *      83.   337. AG
432.   8.7   0.0    9.0
22. Owen SB OUTBOUND                  *  235175.48    850492.88   235201.41    850426.62 *      71.   159. AG
706.   8.7   0.0    9.7
23. EBL                               *  235157.16    850512.56   235169.77    850534.62 *      25.    30.
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AG      7.   9.7   0.0    9.0
24. EBT                          *  235156.48    850506.94   235194.47    850517.81 *      40.    74. AG
734.   8.7   0.0   12.0
25. EBR                          *  235146.28    850504.06   235174.59    850494.12 *      30.   109. AG
239.  10.8   0.0    9.0
26. WBL                          *  235183.81    850524.38   235172.95    850497.75 *      29.   202. AG
157.   9.7   0.0    9.0
27. WBT                          *  235184.27    850530.12   235156.48    850522.06 *      29.   254. AG
504.   8.7   0.0   12.0
28. WBR                          *  235184.27    850529.44   235168.45    850535.38 *      17.   291. AG
93.  10.8   0.0    9.0
29. NBL                          *  235178.67    850509.50   235156.05    850521.88 *      26.   299. AG
132.   9.7   0.0    9.0
30. NBT                          *  235180.75    850510.00   235170.09    850534.50 *      27.   336. AG
332.   8.7   0.0    9.0
31. NBR                          *  235188.33    850495.06   235198.97    850518.94 *      26.    24. AG
301.  10.8   0.0    9.0
32. SBL                          *  235162.09    850534.69   235188.55    850516.94 *      32.   124. AG
103.   9.7   0.0    9.0
33. SBT                          *  235159.89    850532.50   235173.73    850497.75 *      37.   158. AG
310.   8.7   0.0    9.0
34. SBR                          *  235160.44    850532.31   235155.61    850521.56 *      12.   204. AG
13.  10.8   0.0    9.0
```


JOB: First Light-Taunton-Dean, Longmeadow & Owen EX AM RUN: CAL3QHC
RUN

DATE : 12/ 3/12
TIME : 17:43:24

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	* CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Dean EB LL QUEUE	* 120	113	4.0	7	1900	50.22	3	3

4. Dean EB TR QUEUE	*	120	84	4.0	973	1900	50.22	3	3
6. Dean WB LL QUEUE	*	120	104	4.0	157	1900	50.22	3	3
8. Dean WB TR QUEUE	*	120	68	4.0	597	1900	50.22	3	3
10. Owen NB LL QUEUE	*	120	90	4.0	132	1900	50.22	3	3
12. Owen NB T QUEUE	*	120	90	4.0	332	1900	50.22	3	3
14. Owen NB R QUEUE	*	120	90	4.0	301	1900	50.22	3	3
16. Longmeadow SB L QUEUE	*	120	90	4.0	103	1900	50.22	3	3
18. Longmeadow SB TR QUEUE	*	120	90	4.0	323	1900	50.22	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235178.36	850537.06	1.8	*
2. LR_2	*	235171.39	850540.94	1.8	*
3. LR_3	*	235169.19	850544.88	1.8	*
4. LR_4	*	235166.98	850548.81	1.8	*
5. LR_5	*	235163.70	850553.81	1.8	*
6. LR_6	*	235161.97	850558.50	1.8	*
7. LR_7	*	235160.23	850563.19	1.8	*
8. LR_8	*	235158.48	850567.88	1.8	*
9. LR_9	*	235156.75	850572.56	1.8	*
10. LR_10	*	235155.02	850577.25	1.8	*
11. LR_11	*	235153.27	850581.94	1.8	*
12. LR_12	*	235151.53	850586.62	1.8	*
13. LR_13	*	235149.80	850591.31	1.8	*
14. LR_14	*	235148.05	850596.00	1.8	*
15. LR_15	*	235146.31	850600.69	1.8	*
16. LR_16	*	235144.56	850605.38	1.8	*
17. LR_17	*	235142.83	850610.06	1.8	*
18. LR_18	*	235130.50	850610.00	1.8	*
19. LR_19	*	235132.23	850605.31	1.8	*
20. LR_20	*	235133.98	850600.62	1.8	*
21. LR_21	*	235135.72	850595.94	1.8	*
22. LR_22	*	235137.45	850591.25	1.8	*
23. LR_23	*	235139.20	850586.56	1.8	*
24. LR_24	*	235140.94	850581.88	1.8	*
25. LR_25	*	235142.69	850577.19	1.8	*

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen EX AM RUN: CAL3QHC
RUN

RECEPTOR	COORDINATES (M) X	Y	Z
26. LR_26	235144.42	850572.50	1.8
27. LR_27	235146.16	850567.81	1.8
28. LR_28	235147.91	850563.12	1.8
29. LR_29	235149.64	850558.44	1.8
30. LR_30	235151.38	850553.75	1.8
31. LR_31	235153.12	850549.06	1.8
32. LR_32	235154.86	850544.38	1.8
33. LR_33	235154.91	850539.38	1.8
34. LR_34	235156.66	850534.69	1.8
35. LR_35	235153.22	850528.19	1.8
36. LR_36	235149.31	850523.50	1.8
37. LR_37	235144.55	850522.06	1.8
38. LR_38	235139.75	850520.56	1.8
39. LR_39	235134.97	850519.12	1.8
40. LR_40	235130.19	850517.69	1.8
41. LR_41	235125.41	850516.25	1.8
42. LR_42	235120.62	850514.75	1.8
43. LR_43	235115.83	850513.31	1.8
44. LR_44	235111.05	850511.88	1.8
45. LR_45	235106.27	850510.38	1.8
46. LR_46	235101.48	850508.94	1.8
47. LR_47	235096.70	850507.50	1.8
48. LR_48	235091.92	850506.00	1.8
49. LR_49	235087.12	850504.56	1.8
50. LR_50	235082.34	850503.12	1.8
51. LR_51	235077.56	850501.69	1.8
52. LR_52	235072.78	850500.19	1.8
53. LR_53	235068.00	850498.75	1.8
54. LR_54	235063.20	850497.31	1.8
55. LR_55	235073.41	850479.50	1.8
56. LR_56	235078.19	850480.94	1.8
57. LR_57	235082.97	850482.38	1.8
58. LR_58	235087.75	850483.81	1.8
59. LR_59	235092.55	850485.31	1.8

60. LR_60	*	235097.31	850486.75	1.8 *
61. LR_61	*	235102.09	850488.19	1.8 *
62. LR_62	*	235107.00	850489.25	1.8 *
63. LR_63	*	235111.78	850490.69	1.8 *
64. LR_64	*	235116.56	850492.12	1.8 *
65. LR_65	*	235121.34	850493.56	1.8 *
66. LR_66	*	235126.88	850494.75	1.8 *
67. LR_67	*	235131.12	850496.00	1.8 *
68. LR_68	*	235135.80	850497.12	1.8 *
69. LR_69	*	235140.27	850497.81	1.8 *
70. LR_70	*	235145.27	850497.75	1.8 *
71. LR_71	*	235149.83	850496.81	1.8 *
72. LR_72	*	235153.11	850496.06	1.8 *
73. LR_73	*	235156.19	850495.12	1.8 *
74. LR_75	*	235202.16	850511.88	1.8 *
75. LR_76	*	235204.62	850514.00	1.8 *
76. LR_77	*	235207.84	850516.75	1.8 *
77. LR_79	*	235212.31	850520.25	1.8 *
78. LR_80	*	235217.08	850521.75	1.8 *

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen EX AM RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z *
79. LR_81	*	235221.84	850523.25	1.8 *
80. LR_82	*	235226.45	850524.75	1.8 *
81. LR_83	*	235231.23	850526.25	1.8 *
82. LR_84	*	235236.00	850527.75	1.8 *
83. LR_85	*	235240.45	850530.38	1.8 *
84. LR_86	*	235245.23	850531.88	1.8 *
85. LR_87	*	235249.98	850533.38	1.8 *
86. LR_88	*	235254.45	850535.50	1.8 *
87. LR_89	*	235259.22	850537.00	1.8 *
88. LR_90	*	235263.38	850541.00	1.8 *
89. LR_91	*	235268.14	850542.50	1.8 *
90. LR_92	*	235272.91	850544.00	1.8 *
91. LR_93	*	235277.69	850545.50	1.8 *
92. LR_94	*	235275.39	850561.56	1.8 *

93. LR_95	*	235270.62	850560.06	1.8	*
94. LR_96	*	235265.86	850558.56	1.8	*
95. LR_97	*	235261.09	850557.00	1.8	*
96. LR_98	*	235256.31	850555.50	1.8	*
97. LR_99	*	235251.56	850554.00	1.8	*
98. LR_100	*	235246.80	850552.50	1.8	*
99. LR_101	*	235242.02	850551.00	1.8	*
**. LR_102	*	235237.27	850549.50	1.8	*
**. LR_103	*	235232.48	850548.00	1.8	*
**. LR_104	*	235227.72	850546.50	1.8	*
**. LR_105	*	235222.95	850545.00	1.8	*
**. LR_106	*	235218.19	850543.44	1.8	*
**. LR_107	*	235213.42	850541.94	1.8	*
**. LR_108	*	235208.66	850541.38	1.8	*
**. LR_109	*	235202.81	850539.88	1.8	*
**. LR_110	*	235198.05	850538.38	1.8	*
**. LR_111	*	235194.19	850537.31	1.8	*
**. LR_112	*	235189.44	850535.81	1.8	*
**. LR_113	*	235184.66	850534.31	1.8	*
**. LR_114	*	235159.12	850493.88	1.8	*
**. LR_115	*	235161.91	850492.31	1.8	*
**. LR_116	*	235165.55	850490.00	1.8	*
**. LR_117	*	235168.09	850487.94	1.8	*
**. LR_118	*	235170.88	850485.00	1.8	*
**. LR_119	*	235173.97	850481.00	1.8	*
**. LR_120	*	235176.31	850476.75	1.8	*
**. LR_121	*	235178.02	850473.00	1.8	*
**. LR_122	*	235181.77	850468.19	1.8	*
**. LR_123	*	235183.45	850463.50	1.8	*
**. LR_124	*	235185.16	850458.81	1.8	*
**. LR_125	*	235186.86	850454.12	1.8	*
**. LR_126	*	235188.56	850449.38	1.8	*
**. LR_127	*	235190.27	850444.69	1.8	*
**. LR_128	*	235191.95	850440.00	1.8	*
**. LR_129	*	235193.66	850435.31	1.8	*
**. LR_130	*	235195.36	850430.56	1.8	*
**. LR_131	*	235197.06	850425.88	1.8	*
**. LR_132	*	235211.48	850433.06	1.8	*
**. LR_133	*	235209.78	850437.75	1.8	*

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen EX AM RUN: CAL3QHC
RUN

RECEPTOR	X	Y	Z
**. LR_134	235208.08	850442.50	1.8
**. LR_135	235206.38	850447.19	1.8
**. LR_136	235204.69	850451.88	1.8
**. LR_137	235202.98	850456.56	1.8
**. LR_138	235201.28	850461.25	1.8
**. LR_139	235199.58	850466.00	1.8
**. LR_140	235197.88	850470.69	1.8
**. LR_141	235196.19	850475.38	1.8
**. LR_142	235194.48	850480.06	1.8
**. LR_143	235194.25	850485.06	1.8
**. LR_144	235194.02	850489.75	1.8
**. LR_145	235194.09	850494.19	1.8
**. LR_146	235194.45	850498.88	1.8
**. LR_147	235195.98	850503.62	1.8
**. LR_148	235199.00	850508.31	1.8

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.				

```
   0.     0.    0.1    0.1
 10.  *     0.     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 20.  *     0.     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 30.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 60.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.2    0.2
 70.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.2    0.2
 80.  *    0.6    0.3    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 90.  *    0.9    0.5    0.3    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
100.  *     1.    0.7    0.5    0.4    0.3    0.3    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.2    0.2    0.2
110.  *     1.    0.6    0.5    0.5    0.5    0.5    0.3    0.3    0.2    0.1    0.1     0.     0.     0.     0.     0.
0.    0.2    0.2    0.2
120.  *    0.7    0.5    0.5    0.5    0.6    0.5    0.5    0.4    0.4    0.3    0.1    0.1    0.1    0.1    0.1     0.
0.    0.2    0.3    0.3
130.  *    0.6    0.5    0.4    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.4    0.3    0.2    0.2    0.1    0.1
0.1    0.4    0.4    0.5
140.  *    0.7    0.4    0.5    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.2
0.2    0.5    0.5    0.6
150.  *    0.4    0.5    0.5    0.4    0.4    0.3    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.2    0.2    0.1
0.1    0.4    0.4    0.5
160.  *    0.4    0.9    0.8    0.8    0.6    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3
0.4    0.4    0.4    0.5
170.  *    0.7    0.8    0.6    0.7    0.6    0.6    0.5    0.4    0.4    0.5    0.4    0.4    0.5    0.5    0.5    0.5
0.4    0.3    0.3    0.3

------*-------------------------------------------------------------------------------------------------------------
--------------------
MAX   *     1.    0.9    0.8    0.8    0.6    0.6    0.5    0.5    0.4    0.5    0.4    0.4    0.5    0.5    0.5    0.5
0.4    0.5    0.5    0.6
```

DEGR. * 100 160 160 160 120 170 120 130 120 170 130 170 170 170 170 170
160 140 140 140

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
REC17	REC18	REC19	REC20													
180. *	0.6	0.4	0.5	0.5	0.6	0.5	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6
0.5	0.1	0.2	0.2													
190. *	0.3	0.5	0.5	0.6	0.7	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.5
0.5	0.1	0.1	0.2													
200. *	0.3	0.6	0.5	0.5	0.8	0.9	0.8	0.7	0.7	0.8	0.8	0.7	0.7	0.6	0.6	0.4
0.4	0.1	0.1	0.1													
210. *	0.5	0.6	0.6	0.7	1.	0.9	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.4	0.3	0.3
0.3	0.1	0.1	0.1													
220. *	0.6	0.6	0.7	0.9	1.	0.9	0.8	0.8	0.7	0.6	0.5	0.5	0.4	0.3	0.3	0.3
0.3	0.	0.1	0.1													
230. *	0.7	0.7	0.7	0.9	0.9	0.8	0.7	0.5	0.5	0.5	0.5	0.5	0.4	0.2	0.2	0.2
0.2	0.	0.	0.													
240. *	0.7	0.7	0.9	0.9	0.7	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.2
0.2	0.	0.	0.													
250. *	0.5	0.5	0.7	0.7	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.2
0.2	0.	0.	0.													
260. *	0.5	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.2
0.2	0.	0.	0.													
270. *	0.3	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.2

```
0.2     0.     0.     0.
280.  *    0.3    0.5    0.5    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.2
0.2     0.     0.     0.
290.  *    0.3    0.6    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.3    0.3    0.2    0.2
0.1     0.     0.     0.
300.  *    0.4    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.2
0.1     0.     0.     0.
310.  *    0.3    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.1
0.1     0.     0.     0.
320.  *    0.3    0.4    0.5    0.5    0.5    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.1    0.1
0.     0.     0.     0.
330.  *    0.2    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.3    0.3    0.3    0.3    0.2    0.2    0.1    0.1
0.     0.     0.     0.
340.  *    0.1    0.2    0.2    0.2    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1
0.     0.     0.    0.1
350.  *     0.    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1     0.
0.     0.    0.1    0.1
360.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.
0.     0.    0.1    0.1

------*-------------------------------------------------------------------------------------------------------------------------
---------------------
MAX   *     1.    0.9    0.9    0.9     1.    0.9    0.8    0.8    0.7    0.8    0.8    0.7    0.7    0.7    0.6    0.6
0.5    0.5    0.5    0.6
DEGR. *    100    160    240    220    210    200    190    190    180    200    200    190    190    190    180    180
180    140    140    140

      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
```

```
 REC37  REC38  REC39  REC40

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.2    0.2    0.3    0.4    0.6    0.7    0.8    0.8    0.9    0.9     1.    1.1    0.9     1.    0.5    0.3
    0.2    0.1     0.     0.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.2    0.2    0.3    0.4    0.6    0.7    0.8    0.8    0.9    0.9     1.    1.1    0.9     1.    0.5    0.3
 0.2    0.1     0.     0.
 DEGR. *      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
 0      0      0      0
```



```
       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
 REC37  REC38  REC39  REC40

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
  10.  *    0.2    0.2    0.2    0.3    0.6    0.7    0.8    0.8    0.8    0.8    0.8    0.9    0.9     1.    0.5    0.5
  0.3    0.1    0.1    0.1
  20.  *    0.2    0.2    0.2    0.4    0.6    0.6    0.6    0.7    0.7    0.7    0.7    0.9    0.8    0.9    0.5    0.5
  0.3    0.1    0.1    0.1
  30.  *    0.2    0.2    0.2    0.4    0.6    0.6    0.6    0.6    0.6    0.6    0.7    0.9    0.8    0.9    0.5    0.4
  0.5    0.2    0.2    0.2
  40.  *    0.2    0.2    0.2    0.4    0.5    0.6    0.6    0.6    0.6    0.6    0.6    0.9    0.7    0.8    0.5    0.4
  0.3    0.3    0.3    0.2
```

```
 50.  *    0.2    0.2    0.2    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.6    0.9    0.7    0.7    0.3    0.3
 0.3    0.3    0.3    0.2
 60.  *    0.2    0.2    0.2    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.6    0.9    0.7    0.7    0.1    0.3
 0.3    0.2    0.2    0.2
 70.  *    0.2    0.2    0.2    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.7    0.9    0.7    0.9    0.4    0.7
 0.7    0.7    0.7    0.5
 80.  *    0.2    0.2    0.2    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.8     1.     1.     1.    0.7    0.7
 0.7    0.7    0.7    0.8
 90.  *    0.2    0.2    0.3    0.5    0.5    0.5    0.5    0.5    0.6    0.8    1.1    1.3    1.1     1.    0.7    0.8
 0.8    0.7    0.7    0.6
100.  *    0.2    0.2    0.3    0.5    0.5    0.5    0.7    0.8    0.9     1.    1.2    1.4    1.2    0.9    0.7    0.5
0.5    0.4    0.4    0.5
110.  *    0.2    0.2    0.5    0.7    0.7    0.9    0.9     1.     1.    1.1    1.3    1.3    1.1    0.8    0.5    0.5
0.3    0.4    0.6    0.7
120.  *    0.3    0.4    0.7    0.8    0.8    0.9    0.9     1.     1.    1.1    1.3    1.4    1.1    0.7    0.4    0.7
0.5    0.6    0.7    0.6
130.  *    0.5    0.5    0.8    0.8    0.9     1.     1.     1.    1.1     1.    1.1    1.2    0.8    0.6    0.5    0.7
0.7    0.9    0.8    0.9
140.  *    0.6    0.6    0.8    0.9    0.8    0.8    0.9    0.9     1.    1.2    1.3    1.2    0.8    0.7    0.8    0.6
0.8    0.7    0.8    0.8
150.  *    0.5    0.6    0.8    0.8    0.8     1.     1.    0.9    1.2    1.3    1.3    1.3    0.9    0.7    0.7    0.5
0.6    0.8    0.7    0.7
160.  *    0.5    0.6    0.6    0.6    0.6    0.7    0.7    0.7    0.9    1.1    1.2    1.2    0.7    0.5    0.3    0.7
0.6    0.7    0.7    0.7
170.  *    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.6    0.5    0.7    0.5    0.3    0.5    0.5
0.7    0.7    0.7    0.7
180.  *    0.2    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.6    0.4    0.5    0.5    0.7
0.7    0.7    0.7    0.7
190.  *    0.2    0.2    0.2    0.2    0.3    0.4    0.4    0.4    0.4    0.5    0.6    0.6    0.4    0.4    0.5    0.7
0.7    0.7    0.7    0.7
200.  *    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.5    0.4    0.4    0.6    0.7
0.7    0.7    0.7    0.7
210.  *    0.1    0.1    0.1    0.2    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.7    0.7
0.7    0.8    0.8    0.8
220.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.4    0.4    0.4    0.4    0.4    0.5    0.6    0.7    0.9
0.9    0.9    0.9    0.9
230.  *     0.     0.     0.    0.1    0.1    0.1    0.1    0.1    0.2    0.4    0.4    0.4    0.4    0.6    0.8    0.9
0.9    0.9    0.9    0.9
240.  *     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.2    0.3    0.4    0.5    0.7     1.
1.    0.9    0.8    0.7
```

```
 250.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.6    0.7
 0.7    0.7    0.7    0.6
 260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3    0.4
 0.4    0.4    0.4    0.4
 270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2
 0.2    0.2    0.2    0.2
 280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.     0.     0.     0.
 0.1    0.1     0.     0.
 310.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.2    0.2    0.     0.     0.     0.
 0.     0.     0.     0.
 320.  *     0.     0.    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.3    0.1    0.2    0.     0.
 0.     0.     0.     0.
 330.  *    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.3    0.4    0.5    0.6    0.2    0.3    0.     0.
 0.     0.     0.     0.
 340.  *    0.1    0.1    0.1    0.1    0.3    0.4    0.5    0.6    0.7    0.7    0.8    0.9    0.5    0.5    0.2    0.
 0.     0.     0.     0.
 350.  *    0.1    0.2    0.3    0.3    0.5    0.6    0.7    0.8    0.8    0.9     1.    1.1    0.7    0.9    0.4    0.2
 0.     0.     0.     0.
 360.  *    0.2    0.2    0.3    0.4    0.6    0.7    0.8    0.8    0.9    0.9     1.    1.1    0.9     1.    0.5    0.3
 0.2    0.1     0.     0.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.6    0.6    0.8    0.9    0.9     1.     1.     1.    1.2    1.3    1.3    1.4    1.2     1.    0.8     1.
 1.    0.9    0.9    0.9
 DEGR. *    140    140    130    140    130    130    130    110    150    150    110    100    100      0    140    240
 240    130    220    130
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.	1.	1.	1.
10.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.	1.	1.	1.1
20.	*	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.1	1.1	1.1	1.1	1.1	1.1
30.	*	0.2	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.2	1.2	1.2	1.2	1.2	1.2
40.	*	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.4	1.4	1.4	1.4	1.4	1.4
50.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.6	1.6	1.5	1.5	1.5	1.6
60.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.7	1.7	1.7	1.7	1.8	1.8
70.	*	0.6	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	1.6	1.6	1.7	1.7	1.7	1.7
80.	*	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.8	0.8	0.7	0.7	0.7	1.	1.	1.	1.1	1.1	1.1
90.	*	0.5	0.7	0.7	0.7	0.8	0.6	0.6	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.5	0.6	0.6	0.6	0.6
100.	*	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.2	0.2	0.2	0.2	0.3	0.3
110.	*	0.7	0.7	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.1	0.1	0.2	0.2	0.2	0.2
120.	*	0.8	0.8	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.1	0.1	0.1	0.1	0.2	0.2
130.	*	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.	0.	0.	0.1	0.1	0.1
140.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.	0.	0.	0.	0.	0.

```
150.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6     0.     0.
0.     0.     0.     0.
160.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.5     0.     0.
0.     0.     0.     0.
170.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.4     0.     0.
0.     0.     0.     0.
180.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.5    0.3     0.     0.
0.     0.     0.     0.
190.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.6    0.3     0.     0.
0.     0.     0.     0.
200.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.5    0.4     0.     0.
0.    0.1    0.1    0.1
210.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.5    0.4     0.    0.1
0.1    0.1    0.2    0.2
220.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.7    0.7    0.6    0.5    0.4     0.    0.1
0.2    0.2    0.2    0.2
230.  *    0.9    0.9    0.9    0.9    0.9    0.8    0.8    0.8    0.8    0.7    0.6    0.5    0.4    0.3    0.2    0.2
0.2    0.2    0.2    0.4
240.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.5    0.4    0.3    0.3    0.2    0.3    0.4
0.5    0.5    0.5    0.7
250.  *    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.3    0.3    0.3    0.2    0.2    0.1    0.6    0.8
0.9     1.     1.    1.2
260.  *    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.1    0.1     0.    1.1    1.1
1.3    1.3    1.5    1.5
270.  *    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.    1.2    1.3
1.4    1.5    1.6    1.6
280.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.    1.2    1.3
1.3    1.4    1.5    1.6
290.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.    1.1    1.2
1.2    1.4    1.4    1.4
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.    1.1
1.2    1.2    1.2    1.2
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.    1.1
1.1    1.1    1.1    1.1
320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.8     1.
1.     1.     1.    1.1
330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.     1.
1.     1.     1.     1.
340.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.     1.
1.1    1.1    1.1     1.
```

```
 350.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.     1.
 1.1    1.1    1.1     1.
 360.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.     1.
 1.     1.     1.     1.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    1.7    1.7
 1.7    1.7    1.8    1.8
 DEGR. *    220    220    220    220    220    220    220    100    100    100    100    100    100     90     60     60
 60     60     60     60
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
 REC77  REC78  REC79  REC80

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.9     1.     1.    0.9    0.9     1.     1.     1.    1.1    1.1     1.    0.9    0.6    0.7    0.8    0.8
   0.8    0.7    0.6    0.5
  10.  *    1.1     1.    1.1    1.1    1.1    1.1    1.2    1.1    1.1    1.1     1.    0.8    0.5    0.8    0.8    0.8
  0.8    0.7    0.6    0.5
  20.  *    1.1    1.1    1.1    1.1    1.2    1.2    1.2    1.2    1.2    1.2    0.8    0.6    0.3    0.8    0.9    0.8
  0.7    0.7    0.6    0.5
  30.  *    1.2    1.2    1.3    1.3    1.3    1.3    1.3    1.3    1.2     1.    0.8    0.5    0.4    0.7    0.8    0.8
  0.7    0.6    0.6    0.5
  40.  *    1.4    1.4    1.4    1.4    1.4    1.4    1.4    1.4    1.1    1.2    0.7    0.5    0.5    0.7    0.6    0.7
  0.7    0.7    0.6    0.6
```

```
 50.  *    1.6    1.5    1.5    1.5    1.5    1.5    1.6    1.5    1.4    1.3    0.9    0.7    0.7    0.7    0.7    0.8
 0.8    0.7    0.7    0.6
 60.  *    1.8    1.7    1.8    1.8    1.8    1.9    1.9    1.8    1.6    1.2    0.8    0.7    0.7    0.5    0.6    0.7
 0.7    0.7    0.7    0.6
 70.  *    1.7    1.7    1.7    1.8    1.7    1.7    1.6    1.7    1.4     1.    0.5    0.5    0.5    0.3    0.4    0.5
 0.6    0.5    0.5    0.5
 80.  *    1.1    1.1    1.2    1.3    1.3    1.1     1.     1.    0.9    0.7    0.5    0.4    0.4    0.1    0.2    0.3
 0.4    0.4    0.3    0.3
 90.  *    0.7    0.6    0.6    0.6    0.7    0.6    0.6    0.6    0.6    0.4    0.3    0.3    0.3     0.    0.1    0.1
 0.2    0.2    0.2    0.2
100.  *    0.4    0.3    0.3    0.5    0.5    0.3    0.3    0.3    0.4    0.4    0.4    0.5    0.5     0.     0.    0.1
0.1    0.1    0.1    0.1
110.  *    0.2    0.2    0.2    0.3    0.3    0.5    0.5    0.5    0.4    0.3    0.3    0.4    0.4     0.     0.    0.1
0.1    0.1    0.1    0.1
120.  *    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.5    0.4    0.3    0.3    0.3    0.3     0.     0.     0.
0.1    0.1    0.1    0.1
130.  *    0.1    0.1    0.1    0.1    0.2    0.1    0.2    0.2    0.1    0.1    0.3    0.3    0.3     0.     0.     0.
0.1     0.     0.     0.
140.  *     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.1    0.1     0.     0.     0.
0.     0.     0.     0.
150.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1     0.     0.     0.
0.     0.     0.     0.
160.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
170.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1     0.     0.
0.     0.     0.     0.
180.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.2    0.2    0.1
0.     0.     0.     0.
190.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.4    0.3    0.3
0.3    0.2     0.     0.
200.  *    0.1    0.1    0.1    0.1    0.2    0.1    0.1    0.1     0.     0.     0.     0.     0.    0.4    0.3    0.3
0.4    0.4    0.3    0.2
210.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.    0.5    0.3    0.3
0.4    0.4    0.4    0.3
220.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.    0.5    0.5    0.5
0.4    0.4    0.3    0.3
230.  *    0.4    0.3    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.1     0.     0.     0.    0.3    0.3    0.4
0.5    0.3    0.3    0.3
240.  *    0.7    0.7    0.7    0.7    0.8    0.7    0.7    0.7    0.6    0.4    0.2    0.1     0.    0.4    0.4    0.7
0.8    0.8    0.5    0.5
```

```
 250.  *    1.2    1.2    1.2    1.3    1.3    1.2    1.3    1.2    1.1    0.8    0.5    0.3    0.3    0.7    0.8    0.9
 0.8    0.8    0.8    0.8
 260.  *    1.6    1.6    1.7    1.7    1.8    1.7    1.8    1.8    1.7    1.4    0.9    0.8    0.6     1.    0.9    0.9
 0.9    0.9     1.    1.1
 270.  *    1.7    1.8    1.8    1.9    1.9    1.8    1.9    1.8    1.7    1.5    1.2     1.    0.9    0.7    0.8    0.9
 0.9    0.8     1.    0.9
 280.  *    1.6    1.5    1.6    1.6    1.6    1.6    1.6    1.6    1.5    1.4    1.2     1.    0.9    0.6    0.7    0.6
 0.8    0.8     1.     1.
 290.  *    1.4    1.4    1.4    1.4    1.4    1.4    1.4    1.4    1.4    1.3     1.     1.    0.9    0.5    0.6    0.7
 0.9    0.9    0.9     1.
 300.  *    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.1     1.    0.9     1.    0.6    0.8    0.7
 0.9    0.9    1.1     1.
 310.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.9     1.    0.8    0.6    0.8    0.9
 0.9    0.9    0.9    0.8
 320.  *    1.1     1.     1.    1.1    1.1     1.     1.     1.     1.     1.    0.9    0.9    0.8    0.9    0.7    0.8
 0.9    0.9    0.8    0.8
 330.  *    0.9     1.     1.    0.9    0.9     1.     1.     1.     1.     1.     1.    0.9    0.8    0.8    0.7    0.8
 0.9    0.9    0.8    0.7
 340.  *     1.    1.1     1.     1.     1.     1.     1.    1.1     1.     1.     1.    0.8    0.8    0.8    0.8    0.8
 0.9    0.8    0.8    0.7
 350.  *     1.    1.1     1.     1.     1.     1.     1.    1.1     1.     1.    1.1    0.9    0.8    0.7    0.8    0.8
 0.8    0.8    0.7    0.6
 360.  *    0.9     1.     1.    0.9    0.9     1.     1.     1.    1.1    1.1     1.    0.9    0.6    0.7    0.8    0.8
 0.8    0.7    0.6    0.5

 ------*-----------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *    1.8    1.8    1.8    1.9    1.9    1.9    1.9    1.8    1.7    1.5    1.2     1.     1.     1.    0.9    0.9
 0.9    0.9    1.1    1.1
 DEGR. *     60    270     60    270    270     60     60     60    260    270    270    270    300    260     20    250
 260    260    300    260
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88	REC89	REC90	REC91	REC92	REC93	REC94	REC95	REC96	REC97	REC98	REC99	REC100
.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20.	*	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30.	*	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
40.	*	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.3	0.1	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1
50.	*	0.6	0.6	0.6	0.6	0.5	0.5	0.4	0.4	0.2	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
60.	*	0.6	0.6	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.	0.	0.	0.	0.1	0.1	0.1	0.2	0.2	0.2	0.2
70.	*	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.	0.	0.	0.	0.1	0.2	0.2	0.2	0.2	0.2	0.3
80.	*	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.	0.	0.	0.1	0.1	0.2	0.2	0.2	0.2	0.4	0.4
90.	*	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.	0.	0.	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.4
100.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.5
110.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.1	0.2	0.3	0.3	0.4	0.4	0.4	0.4
120.	*	0.	0.	0.1	0.1	0.	0.1	0.	0.1	0.1	0.	0.	0.	0.1	0.2	0.3	0.4	0.4	0.4	0.4	0.4
130.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.	0.	0.	0.	0.1	0.2	0.3	0.4	0.4	0.4	0.4	0.4
140.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.	0.	0.	0.	0.1	0.3	0.4	0.4	0.4	0.4	0.4	0.4

150. * 0. 0. 0. 0. 0. 0. 0. 0.1 0.1 0. 0. 0. 0.1 0.3 0.4 0.4
0.4 0.4 0.4 0.4
160. * 0. 0. 0. 0. 0. 0. 0. 0.1 0.1 0.1 0. 0. 0.3 0.4 0.4 0.4
0.4 0.4 0.4 0.3
170. * 0. 0. 0. 0. 0. 0. 0. 0.1 0.1 0. 0. 0.1 0.3 0.4 0.4 0.4
0.4 0.4 0.4 0.3
180. * 0. 0. 0. 0. 0. 0. 0. 0.1 0.1 0. 0. 0.2 0.4 0.4 0.4 0.4
0.4 0.4 0.4 0.4
190. * 0. 0. 0. 0. 0. 0. 0. 0.1 0.1 0.1 0. 0.2 0.4 0.5 0.5 0.5
0.4 0.4 0.4 0.4
200. * 0.1 0. 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0. 0.3 0.5 0.5 0.5 0.5
0.5 0.5 0.5 0.4
210. * 0.3 0.2 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0. 0.4 0.5 0.5 0.5 0.5
0.5 0.5 0.5 0.6
220. * 0.3 0.3 0.3 0.1 0.1 0.1 0.1 0.2 0.2 0.2 0.1 0.5 0.6 0.5 0.5 0.5
0.5 0.6 0.6 0.8
230. * 0.3 0.2 0.3 0.3 0.2 0.2 0.2 0.3 0.3 0.3 0.2 0.6 0.6 0.6 0.7 0.7
0.8 0.7 0.8 0.9
240. * 0.5 0.5 0.5 0.4 0.4 0.5 0.4 0.6 0.6 0.6 0.5 0.9 0.8 0.8 0.8 0.8
0.8 0.9 1. 1.
250. * 0.8 0.8 0.9 0.8 0.8 0.8 0.7 0.9 1. 1. 0.8 0.7 0.7 0.7 0.7 0.7
0.8 0.9 0.9 0.8
260. * 1.2 1.1 1. 1. 1. 1. 1. 1. 1. 1. 0.9 0.5 0.5 0.5 0.5 0.5
0.6 0.6 0.6 0.6
270. * 1. 1.1 1.1 1.1 1.1 0.8 0.8 0.9 0.9 0.9 0.8 0.2 0.2 0.2 0.2 0.2
0.2 0.2 0.3 0.3
280. * 1. 1. 1. 1. 0.8 0.8 0.8 0.8 0.7 0.7 0.5 0.1 0.1 0.1 0.1 0.1
0.1 0.1 0.1 0.1
290. * 1. 0.9 0.9 0.7 0.7 0.6 0.5 0.6 0.6 0.6 0.5 0. 0.1 0.1 0.1 0.1
0.1 0.1 0.1 0.1
300. * 0.9 0.9 0.7 0.7 0.5 0.5 0.5 0.4 0.5 0.5 0.4 0. 0. 0. 0. 0.
0. 0. 0. 0.
310. * 0.8 0.7 0.5 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.2 0. 0. 0. 0. 0.
0. 0. 0. 0.
320. * 0.7 0.5 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.2 0. 0. 0. 0. 0.
0. 0. 0. 0.
330. * 0.6 0.5 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.1 0. 0. 0. 0. 0.
0. 0. 0. 0.
340. * 0.5 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.3 0.1 0. 0. 0. 0. 0.
0. 0. 0. 0.

```
 350.  *    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.1     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 360.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.2    1.1    1.1    1.1    1.1     1.     1.     1.     1.     1.    0.9    0.9    0.8    0.8    0.8    0.8
 0.8    0.9     1.     1.
 DEGR. *    260    260    270    270    270    260    260    260    250    250    260    240    240    240    240    240
 230    240    240    240
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC101 REC102 REC103 REC104 REC105 REC106 REC107 REC108 REC109 REC110 REC111 REC112 REC113 REC114 REC115 REC116
 REC117 REC118 REC119 REC120

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.4    0.3    0.4    0.3    0.3
   0.2    0.5    0.6    0.6
  10.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.3    0.4    0.3    0.3    0.3
  0.6    0.6    0.7     1.
  20.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.4    0.3    0.4    0.4    0.6
  0.7    0.9    0.9     1.
  30.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.5    0.4    0.5    0.7    0.8
  0.9    0.9    1.1    0.8
  40.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.7    0.7    0.8    0.7    0.7
  1.    0.9    0.6    0.8
```

```
 50.  *    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.7    0.8    0.8    0.7    0.8
 0.7    0.6    0.6    0.8
 60.  *    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.8    0.7    0.4    0.4    0.6
 0.6    0.6    0.5    0.7
 70.  *    0.3    0.3    0.3    0.3    0.6    0.5    0.7    0.7    0.8    0.8    0.9    0.4    0.4    0.4    0.4    0.6
 0.5    0.5    0.5    0.7
 80.  *    0.4    0.4    0.4    0.4    0.6    0.7    0.8     1.    1.1    1.1    1.2    0.4    0.3    0.3    0.6    0.5
 0.5    0.5    0.5    0.7
 90.  *    0.5    0.5    0.5    0.5    0.8     1.    1.2    1.3    1.4    1.5    1.5    0.4    0.5    0.4    0.4    0.5
 0.5    0.5    0.5    0.6
100.  *    0.5    0.5    0.5    0.5    0.9    1.1    1.3    1.4    1.4    1.4    1.5    0.5    0.3    0.3    0.5    0.5
0.5    0.5    0.5    0.7
110.  *    0.4    0.4    0.4    0.5    0.9    1.1    1.2    1.3    1.3    1.3    1.3    0.3    0.3    0.4    0.5    0.5
0.5    0.5    0.5    0.7
120.  *    0.4    0.4    0.4    0.5     1.    1.1    1.2    1.2    1.2    1.2    1.2    0.3    0.3    0.5    0.5    0.5
0.7    0.7    0.7    0.7
130.  *    0.4    0.4    0.4    0.6     1.    1.1    1.2    1.2    1.2    1.2    1.1    0.3    0.4    0.5    0.5    0.6
0.6    0.6    0.6    0.7
140.  *    0.4    0.4    0.5    0.6    1.1    1.1    1.1    1.1    1.1    1.1    0.9    0.1    0.4    0.4    0.4    0.5
0.6    0.6    0.5    0.6
150.  *    0.4    0.3    0.4    0.5     1.    1.1    1.1    1.1    1.1     1.     1.    0.1    0.1    0.1    0.2    0.2
0.3    0.3    0.3    0.4
160.  *    0.3    0.3    0.5    0.5     1.    1.1    1.1    1.1    1.1     1.     1.    0.     0.    0.1    0.1    0.1
0.2    0.2    0.2    0.4
170.  *    0.3    0.4    0.5    0.6     1.    1.1    1.1    1.1    1.2    1.4     1.    0.     0.    0.     0.    0.1
0.1    0.1    0.1    0.2
180.  *    0.4    0.5    0.6    0.7     1.    1.1    1.3    1.3    1.5    1.4    1.1    0.     0.    0.     0.    0.
0.    0.1    0.1    0.1
190.  *    0.5    0.6    0.6    0.9    1.4    1.3    1.4    1.5    1.4    1.2    0.7    0.     0.    0.     0.    0.
0.     0.     0.    0.1
200.  *    0.5    0.6    0.9    1.2    1.5    1.5    1.4    1.4    1.3    1.1    0.4    0.     0.    0.     0.    0.
0.     0.     0.    0.1
210.  *    0.8    0.7     1.    1.3    1.5    1.4    1.4    1.3     1.    0.8    0.4    0.     0.    0.     0.    0.
0.     0.     0.     0.
220.  *    0.8    0.9    1.1    1.5    1.5    1.3    1.2    1.1    1.1    0.8    0.7    0.     0.    0.     0.    0.
0.     0.     0.     0.
230.  *    1.1    1.3    1.2    1.5    1.7    1.5    1.3    1.4    1.2    0.9    0.7    0.     0.    0.     0.    0.
0.     0.     0.     0.
240.  *    1.2    1.3    1.5    1.7    1.8    1.5    1.5    1.3    1.1     1.    0.8    0.     0.    0.     0.    0.
0.     0.     0.     0.
```

```
250.  *    0.9    1.2    1.3    1.5    1.6    1.3    1.2    1.1    0.9    0.8    0.7    0.3    0.1    0.1    0.1     0.
0.     0.     0.     0.
260.  *    0.6    0.6    0.6    0.8     1.    0.8    0.8    0.6    0.6    0.5    0.4    0.5    0.4    0.3    0.3    0.2
0.1    0.1    0.1     0.
270.  *    0.3    0.3    0.4    0.5    0.5    0.3    0.3    0.3    0.3    0.3    0.2    0.8    0.7    0.6    0.4    0.4
0.3    0.3    0.1    0.1
280.  *    0.1    0.1    0.3    0.3    0.4    0.3    0.3    0.3    0.3    0.3    0.4    0.9    0.7    0.7    0.6    0.5
0.4    0.3    0.3    0.3
290.  *    0.1    0.1    0.1    0.1    0.3    0.2    0.1    0.2    0.2    0.3    0.3    0.7    0.7    0.7    0.6    0.6
0.5    0.4    0.4    0.3
300.  *    0.1    0.1    0.1    0.1    0.2     0.    0.1    0.2    0.2    0.2    0.3    0.8    0.8    0.7    0.6    0.5
0.4    0.4    0.4    0.5
310.  *     0.     0.     0.     0.    0.1     0.     0.    0.1    0.2    0.2    0.2    0.8    0.7    0.6    0.6    0.5
0.4    0.4    0.4    0.5
320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.8    0.7    0.5    0.5    0.5
0.4    0.3    0.2    0.3
330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.7    0.5    0.5    0.5    0.4
0.3    0.2    0.2    0.3
340.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.6    0.4    0.4    0.3
0.4    0.3    0.4    0.5
350.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.6    0.4    0.3    0.4    0.4
0.4    0.3    0.3    0.6
360.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.4    0.3    0.4    0.3    0.3
0.2    0.5    0.6    0.6

------*-----------------------------------------------------------------------------------------------------------------
----------------------
MAX   *    1.2    1.3    1.5    1.7    1.8    1.5    1.5    1.5    1.5    1.5    1.5    0.9    0.8    0.8    0.7    0.8
1.    0.9    1.1     1.
DEGR. *    240    230    240    240    240    200    240    190    180     90     90    280     50     40     30     30
40     20     30     10
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND * CONCENTRATION
ANGLE * (PPM)
(DEGR)* REC121 REC122 REC123 REC124 REC125 REC126 REC127 REC128 REC129 REC130 REC131 REC132 REC133 REC134 REC135 REC136 REC137 REC138 REC139 REC140

.	*	0.7	0.8	0.9	0.8	0.8	0.8	0.9	0.9	0.8	0.4	0.4	0.5	0.5	0.6	0.7	0.8	0.8	0.8	0.9	1.
10.	*	1.	0.9	0.9	1.	1.1	1.	0.9	0.9	0.8	0.1	0.2	0.2	0.2	0.3	0.3	0.5	0.6	0.6	0.6	0.8
20.	*	1.	1.1	1.1	1.	1.	0.9	0.9	0.8	0.7	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.7
30.	*	0.8	0.9	0.9	0.9	0.9	0.8	0.6	0.6	0.3	0.	0.	0.	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4
40.	*	0.8	0.8	0.9	0.9	0.7	0.6	0.5	0.4	0.3	0.	0.	0.	0.	0.	0.	0.1	0.1	0.2	0.2	0.2
50.	*	0.8	0.7	0.7	0.6	0.6	0.5	0.4	0.3	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2
60.	*	0.7	0.7	0.7	0.6	0.5	0.5	0.4	0.3	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
70.	*	0.7	0.7	0.6	0.6	0.5	0.4	0.3	0.3	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
80.	*	0.7	0.7	0.6	0.5	0.5	0.4	0.3	0.3	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
90.	*	0.7	0.6	0.6	0.5	0.4	0.3	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
100.	*	0.7	0.6	0.6	0.5	0.3	0.3	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1
110.	*	0.6	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.2
120.	*	0.7	0.6	0.4	0.4	0.4	0.3	0.2	0.2	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.2	0.2	0.2
130.	*	0.5	0.4	0.4	0.4	0.3	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.	0.2	0.2	0.2	0.2	0.3	0.3
140.	*	0.5	0.4	0.3	0.3	0.3	0.3	0.2	0.1	0.	0.	0.	0.	0.1	0.1	0.3	0.4	0.4	0.5	0.5	0.6

150.	*	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.1	0.	0.	0.	0.2	0.2	0.3	0.4	0.5
0.6	0.8	0.8	1.														
160.	*	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.	0.	0.1	0.2	0.2	0.4	0.5	0.7
1.1	1.3	1.3	1.4														
170.	*	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.	0.	0.1	0.2	0.2	0.4	0.7	1.1
1.5	1.6	1.7	1.8														
180.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.1	0.2	0.2	0.6	1.	1.3
1.5	1.6	1.6	1.9														
190.	*	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.1	0.2	0.3	0.6	0.9	1.3
1.5	1.5	1.5	1.6														
200.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.3	0.3	0.7	0.9	1.1
1.3	1.3	1.3	1.3														
210.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.3	0.3	0.7	0.8	1.1
1.1	1.1	1.1	1.1														
220.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.3	0.3	0.7	0.9	1.
1.	1.	1.	1.														
230.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.3	0.3	0.7	0.9	1.
1.	1.	0.9	0.9														
240.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.3	0.3	0.7	1.	1.
1.	0.9	0.9	0.9														
250.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.3	0.3	0.3	0.7	1.	1.
1.	0.9	0.9	0.9														
260.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.3	0.3	0.4	0.7	1.	1.
1.	0.9	1.	1.														
270.	*	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.2	0.3	0.3	0.4	0.9	1.1	1.1
1.1	1.1	1.1	1.2														
280.	*	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.4	0.4	0.4	0.6	0.9	1.1	1.2
1.3	1.3	1.3	1.2														
290.	*	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.4	0.5	0.5	0.9	1.2	1.5	1.5
1.4	1.4	1.5	1.5														
300.	*	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.6	0.6	0.7	1.1	1.3	1.5	1.5
1.4	1.4	1.4	1.4														
310.	*	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.8	0.9	1.1	1.4	1.7	1.7	1.7
1.5	1.5	1.6	1.6														
320.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.9	1.	1.2	1.5	1.6	1.8	1.8
1.8	1.9	1.9	1.7														
330.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.8	1.	1.2	1.5	1.7	1.8	1.8
1.8	1.7	1.8	1.9														
340.	*	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.8	0.9	1.	1.2	1.3	1.4	1.5
1.6	1.5	1.5	1.5														

```
 350.  *    0.6    0.7    0.6    0.5    0.6    0.7    0.7    0.7    0.7    0.4    0.5    0.5    0.8    0.9    0.9     1.
 1.    1.1    1.1    1.2
 360.  *    0.7    0.8    0.9    0.8    0.8    0.8    0.9    0.9    0.8    0.4    0.4    0.5    0.5    0.6    0.7    0.8
 0.8    0.8    0.9     1.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *     1.    1.1    1.1     1.    1.1     1.    0.9    0.9    0.8    0.9     1.    1.2    1.5    1.7    1.8    1.8
 1.8    1.9    1.9    1.9
 DEGR. *     10     20     20     10     10     10      0      0      0    320    320    320    320    310    320    320
 320    320    320    180
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC141	REC142	REC143	REC144	REC145	REC146
.	*	0.6	0.5	0.6	0.7	0.7	0.7
10.	*	0.6	0.5	0.5	0.6	0.7	0.8
20.	*	0.4	0.4	0.6	0.6	0.7	0.8
30.	*	0.4	0.5	0.5	0.6	0.6	0.6
40.	*	0.2	0.3	0.4	0.4	0.7	0.7
50.	*	0.1	0.1	0.2	0.3	0.5	0.6
60.	*	0.	0.1	0.1	0.1	0.2	0.4
70.	*	0.	0.	0.	0.1	0.1	0.2
80.	*	0.	0.	0.	0.	0.	0.1
90.	*	0.	0.	0.	0.	0.	0.
100.	*	0.	0.	0.	0.	0.	0.
110.	*	0.	0.	0.	0.	0.	0.
120.	*	0.	0.	0.	0.	0.	0.

130.	*	0.2	0.	0.	0.	0.	0.
140.	*	0.2	0.1	0.	0.	0.	0.
150.	*	0.6	0.2	0.2	0.	0.	0.
160.	*	1.	0.7	0.5	0.3	0.1	0.
170.	*	1.5	1.	0.9	0.6	0.4	0.2
180.	*	1.6	1.2	1.	0.8	0.7	0.5
190.	*	1.3	1.1	1.	0.8	0.8	0.6
200.	*	1.1	1.	0.9	0.8	0.8	0.6
210.	*	1.	1.	0.8	0.8	0.7	0.5
220.	*	1.	1.	0.8	0.8	0.7	0.6
230.	*	1.	0.8	0.8	0.7	0.6	0.5
240.	*	1.	0.8	0.9	0.6	0.6	0.5
250.	*	1.	0.8	0.9	0.8	0.8	0.7
260.	*	1.1	1.2	1.2	0.9	0.9	0.9
270.	*	1.3	1.3	1.	1.1	1.	0.9
280.	*	1.4	1.4	1.1	1.1	0.9	0.6
290.	*	1.5	1.4	1.	0.9	0.7	0.3
300.	*	1.4	1.3	0.8	0.5	0.3	0.4
310.	*	1.4	1.	0.6	0.4	0.6	0.5
320.	*	1.3	1.1	0.6	0.5	0.4	0.6
330.	*	1.3	0.9	0.4	0.4	0.6	0.5
340.	*	1.1	0.5	0.3	0.4	0.4	0.7
350.	*	0.9	0.4	0.4	0.5	0.7	0.7
360.	*	0.6	0.5	0.6	0.7	0.7	0.7
MAX	*	1.6	1.4	1.2	1.1	1.	0.9
DEGR.	*	180	280	260	270	270	260

THE HIGHEST CONCENTRATION OF 1.90 ppm OCCURRED AT RECEPTOR REC66.

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*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/3/2012 5:49:43 PM
** File: F:\2975 FirstLight\Microscale\Worst\34 Dean Longmeadow & Owen LOS&ADT\2012EXPM.ou2
**
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: First Light-Taunton-Dean, Longmeadow & Owen EX PM RUN: CAL3QHC RUN

DATE : 12/ 3/12
TIME : 17:49:42

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE
VPH EF H W V/C QUEUE	*	X1	Y1	X2	Y2	*	(M)		
	*	(DEG)	(G/MI)	(M)	(M)	(VEH)			
1. Dean EB LL	*	235106.84	850497.38	235156.62	850512.50	*	52.	73.	AG
10. 8.7 0.0 9.0									
2. Dean EB LL QUEUE	*	235156.62	850512.50	235153.94	850511.69	*	3.	253.	AG
127. 100.0 0.0 3.0 0.67 0.5									
3. Dean EB TR	*	235066.06	850482.19	235155.91	850506.75	*	93.	75.	AG

969. 8.7 0.0 13.4

4. Dean EB TR QUEUE * 235155.91 850506.75 235029.84 850472.31 * 131. 255. AG
189. 100.0 0.0 7.4 1.02 21.8

5. Dean WB LL * 235225.55 850536.69 235185.14 850524.44 * 42. 253. AG
357. 8.7 0.0 9.4

6. Dean WB LL QUEUE * 235185.14 850524.44 235618.97 850655.94 * 453. 73. AG
111. 100.0 0.0 3.4 1.51 75.6

7. Dean WB TR * 235275.70 850557.25 235185.14 850530.19 * 95. 253. AG
1068. 8.7 0.0 13.4

8. Dean WB TR QUEUE * 235185.14 850530.19 235238.86 850546.25 * 56. 73. AG
141. 100.0 0.0 7.4 0.66 9.3

9. Owen NB LL * 235207.16 850428.06 235179.00 850508.50 * 85. 341. AG
57. 8.7 0.0 9.7

10. Owen NB LL QUEUE * 235179.00 850508.50 235181.83 850500.44 * 9. 161. AG
101. 100.0 0.0 3.7 0.15 1.4

11. Owen NB T * 235208.59 850429.88 235181.17 850508.88 * 84. 341. AG
271. 8.7 0.0 9.7

12. Owen NB T QUEUE * 235181.17 850508.88 235194.69 850469.94 * 41. 161. AG
101. 100.0 0.0 3.7 0.72 6.9

13. Owen NB R * 235207.52 850436.38 235189.47 850493.75 * 60. 343. AG
280. 8.7 0.0 9.7

14. Owen NB R QUEUE * 235189.47 850493.75 235202.42 850452.56 * 43. 163. AG
101. 100.0 0.0 3.7 0.74 7.2

15. Longmeadow SB L * 235147.36 850577.25 235162.05 850535.25 * 44. 161. AG
137. 8.7 0.0 9.0

16. Longmeadow SB L QUEUE * 235162.05 850535.25 235155.36 850554.69 * 21. 341. AG
101. 100.0 0.0 3.0 0.36 3.4

17. Longmeadow SB TR * 235134.16 850612.38 235159.88 850533.06 * 83. 162. AG
358. 8.7 0.0 9.0

18. Longmeadow SB TR QUEUE * 235159.88 850533.06 235137.86 850600.62 * 71. 342. AG
101. 100.0 0.0 3.0 0.94 11.8

19. Dean EB OUTBOUND * 235195.64 850518.06 235273.02 850547.94 * 83. 69. AG
1225. 8.7 0.0 13.4

20. Dean WB OUTBOUND * 235156.41 850522.00 235064.98 850493.25 * 96. 253. AG
915. 8.7 0.0 13.4

21. Longmeadow NB OUTBOUND * 235170.09 850535.00 235137.33 850611.62 * 83. 337. AG
508. 8.7 0.0 9.0

22. Owen SB OUTBOUND * 235175.48 850492.88 235201.41 850426.62 * 71. 159. AG
859. 8.7 0.0 9.7

23. EBL * 235157.16 850512.56 235169.77 850534.62 * 25. 30. AG

```
10.   9.7   0.0    9.0
24. EBT                          *  235156.48    850506.94   235194.47    850517.81 *      40.     74. AG
808.   8.7   0.0   12.0
25. EBR                          *  235146.28    850504.06   235174.59    850494.12 *      30.    109. AG
161.  10.8   0.0    9.0
26. WBL                          *  235183.81    850524.38   235172.95    850497.75 *      29.    202. AG
357.   9.7   0.0    9.0
27. WBT                          *  235184.27    850530.12   235156.48    850522.06 *      29.    254. AG
841.   8.7   0.0   12.0
28. WBR                          *  235184.27    850529.44   235168.45    850535.38 *      17.    291. AG
227.  10.8   0.0    9.0
29. NBL                          *  235178.67    850509.50   235156.05    850521.88 *      26.    299. AG
57.   9.7   0.0    9.0
30. NBT                          *  235180.75    850510.00   235170.09    850534.50 *      27.    336. AG
271.   8.7   0.0    9.0
31. NBR                          *  235188.33    850495.06   235198.97    850518.94 *      26.     24. AG
280.  10.8   0.0    9.0
32. SBL                          *  235162.09    850534.69   235188.55    850516.94 *      32.    124. AG
137.   9.7   0.0    9.0
33. SBT                          *  235159.89    850532.50   235173.73    850497.75 *      37.    158. AG
341.   8.7   0.0    9.0
34. SBR                          *  235160.44    850532.31   235155.61    850521.56 *      12.    204. AG
17.  10.8   0.0    9.0
```


JOB: First Light-Taunton-Dean, Longmeadow & Owen EX PM RUN: CAL3QHC
RUN

DATE : 12/ 3/12
TIME : 17:49:42

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	* CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Dean EB LL QUEUE	* 120	113	4.0	10	1900	50.22	3	3

4. Dean EB TR QUEUE	*	120	84	4.0	969	1900	50.22	3	3
6. Dean WB LL QUEUE	*	120	99	4.0	357	1900	50.22	3	3
8. Dean WB TR QUEUE	*	120	63	4.0	1068	1900	50.22	3	3
10. Owen NB LL QUEUE	*	120	90	4.0	57	1900	50.22	3	3
12. Owen NB T QUEUE	*	120	90	4.0	271	1900	50.22	3	3
14. Owen NB R QUEUE	*	120	90	4.0	280	1900	50.22	3	3
16. Longmeadow SB L QUEUE	*	120	90	4.0	137	1900	50.22	3	3
18. Longmeadow SB TR QUEUE	*	120	90	4.0	358	1900	50.22	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235178.36	850537.06	1.8	*
2. LR_2	*	235171.39	850540.94	1.8	*
3. LR_3	*	235169.19	850544.88	1.8	*
4. LR_4	*	235166.98	850548.81	1.8	*
5. LR_5	*	235163.70	850553.81	1.8	*
6. LR_6	*	235161.97	850558.50	1.8	*
7. LR_7	*	235160.23	850563.19	1.8	*
8. LR_8	*	235158.48	850567.88	1.8	*
9. LR_9	*	235156.75	850572.56	1.8	*
10. LR_10	*	235155.02	850577.25	1.8	*
11. LR_11	*	235153.27	850581.94	1.8	*
12. LR_12	*	235151.53	850586.62	1.8	*
13. LR_13	*	235149.80	850591.31	1.8	*
14. LR_14	*	235148.05	850596.00	1.8	*
15. LR_15	*	235146.31	850600.69	1.8	*
16. LR_16	*	235144.56	850605.38	1.8	*
17. LR_17	*	235142.83	850610.06	1.8	*
18. LR_18	*	235130.50	850610.00	1.8	*
19. LR_19	*	235132.23	850605.31	1.8	*
20. LR_20	*	235133.98	850600.62	1.8	*
21. LR_21	*	235135.72	850595.94	1.8	*
22. LR_22	*	235137.45	850591.25	1.8	*
23. LR_23	*	235139.20	850586.56	1.8	*
24. LR_24	*	235140.94	850581.88	1.8	*
25. LR_25	*	235142.69	850577.19	1.8	*

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen EX PM RUN: CAL3QHC
RUN

RECEPTOR	COORDINATES (M) X	Y	Z
26. LR_26	235144.42	850572.50	1.8
27. LR_27	235146.16	850567.81	1.8
28. LR_28	235147.91	850563.12	1.8
29. LR_29	235149.64	850558.44	1.8
30. LR_30	235151.38	850553.75	1.8
31. LR_31	235153.12	850549.06	1.8
32. LR_32	235154.86	850544.38	1.8
33. LR_33	235154.91	850539.38	1.8
34. LR_34	235156.66	850534.69	1.8
35. LR_35	235153.22	850528.19	1.8
36. LR_36	235149.31	850523.50	1.8
37. LR_37	235144.55	850522.06	1.8
38. LR_38	235139.75	850520.56	1.8
39. LR_39	235134.97	850519.12	1.8
40. LR_40	235130.19	850517.69	1.8
41. LR_41	235125.41	850516.25	1.8
42. LR_42	235120.62	850514.75	1.8
43. LR_43	235115.83	850513.31	1.8
44. LR_44	235111.05	850511.88	1.8
45. LR_45	235106.27	850510.38	1.8
46. LR_46	235101.48	850508.94	1.8
47. LR_47	235096.70	850507.50	1.8
48. LR_48	235091.92	850506.00	1.8
49. LR_49	235087.12	850504.56	1.8
50. LR_50	235082.34	850503.12	1.8
51. LR_51	235077.56	850501.69	1.8
52. LR_52	235072.78	850500.19	1.8
53. LR_53	235068.00	850498.75	1.8
54. LR_54	235063.20	850497.31	1.8
55. LR_55	235073.41	850479.50	1.8
56. LR_56	235078.19	850480.94	1.8
57. LR_57	235082.97	850482.38	1.8
58. LR_58	235087.75	850483.81	1.8
59. LR_59	235092.55	850485.31	1.8

60. LR_60	*	235097.31	850486.75	1.8 *
61. LR_61	*	235102.09	850488.19	1.8 *
62. LR_62	*	235107.00	850489.25	1.8 *
63. LR_63	*	235111.78	850490.69	1.8 *
64. LR_64	*	235116.56	850492.12	1.8 *
65. LR_65	*	235121.34	850493.56	1.8 *
66. LR_66	*	235126.88	850494.75	1.8 *
67. LR_67	*	235131.12	850496.00	1.8 *
68. LR_68	*	235135.80	850497.12	1.8 *
69. LR_69	*	235140.27	850497.81	1.8 *
70. LR_70	*	235145.27	850497.75	1.8 *
71. LR_71	*	235149.83	850496.81	1.8 *
72. LR_72	*	235153.11	850496.06	1.8 *
73. LR_73	*	235156.19	850495.12	1.8 *
74. LR_75	*	235202.16	850511.88	1.8 *
75. LR_76	*	235204.62	850514.00	1.8 *
76. LR_77	*	235207.84	850516.75	1.8 *
77. LR_79	*	235212.31	850520.25	1.8 *
78. LR_80	*	235217.08	850521.75	1.8 *

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen EX PM RUN: CAL3QHC
RUN

RECEPTOR	*	X	Y	Z *
	*	COORDINATES (M)		*
79. LR_81	*	235221.84	850523.25	1.8 *
80. LR_82	*	235226.45	850524.75	1.8 *
81. LR_83	*	235231.23	850526.25	1.8 *
82. LR_84	*	235236.00	850527.75	1.8 *
83. LR_85	*	235240.45	850530.38	1.8 *
84. LR_86	*	235245.23	850531.88	1.8 *
85. LR_87	*	235249.98	850533.38	1.8 *
86. LR_88	*	235254.45	850535.50	1.8 *
87. LR_89	*	235259.22	850537.00	1.8 *
88. LR_90	*	235263.38	850541.00	1.8 *
89. LR_91	*	235268.14	850542.50	1.8 *
90. LR_92	*	235272.91	850544.00	1.8 *
91. LR_93	*	235277.69	850545.50	1.8 *
92. LR_94	*	235275.39	850561.56	1.8 *

93.	LR_95	*	235270.62	850560.06	1.8 *
94.	LR_96	*	235265.86	850558.56	1.8 *
95.	LR_97	*	235261.09	850557.00	1.8 *
96.	LR_98	*	235256.31	850555.50	1.8 *
97.	LR_99	*	235251.56	850554.00	1.8 *
98.	LR_100	*	235246.80	850552.50	1.8 *
99.	LR_101	*	235242.02	850551.00	1.8 *
**.	LR_102	*	235237.27	850549.50	1.8 *
**.	LR_103	*	235232.48	850548.00	1.8 *
**.	LR_104	*	235227.72	850546.50	1.8 *
**.	LR_105	*	235222.95	850545.00	1.8 *
**.	LR_106	*	235218.19	850543.44	1.8 *
**.	LR_107	*	235213.42	850541.94	1.8 *
**.	LR_108	*	235208.66	850541.38	1.8 *
**.	LR_109	*	235202.81	850539.88	1.8 *
**.	LR_110	*	235198.05	850538.38	1.8 *
**.	LR_111	*	235194.19	850537.31	1.8 *
**.	LR_112	*	235189.44	850535.81	1.8 *
**.	LR_113	*	235184.66	850534.31	1.8 *
**.	LR_114	*	235159.12	850493.88	1.8 *
**.	LR_115	*	235161.91	850492.31	1.8 *
**.	LR_116	*	235165.55	850490.00	1.8 *
**.	LR_117	*	235168.09	850487.94	1.8 *
**.	LR_118	*	235170.88	850485.00	1.8 *
**.	LR_119	*	235173.97	850481.00	1.8 *
**.	LR_120	*	235176.31	850476.75	1.8 *
**.	LR_121	*	235178.02	850473.00	1.8 *
**.	LR_122	*	235181.77	850468.19	1.8 *
**.	LR_123	*	235183.45	850463.50	1.8 *
**.	LR_124	*	235185.16	850458.81	1.8 *
**.	LR_125	*	235186.86	850454.12	1.8 *
**.	LR_126	*	235188.56	850449.38	1.8 *
**.	LR_127	*	235190.27	850444.69	1.8 *
**.	LR_128	*	235191.95	850440.00	1.8 *
**.	LR_129	*	235193.66	850435.31	1.8 *
**.	LR_130	*	235195.36	850430.56	1.8 *
**.	LR_131	*	235197.06	850425.88	1.8 *
**.	LR_132	*	235211.48	850433.06	1.8 *
**.	LR_133	*	235209.78	850437.75	1.8 *

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen EX PM RUN: CAL3QHC
RUN

RECEPTOR	COORDINATES (M) X	Y	Z
**. LR_134	235208.08	850442.50	1.8
**. LR_135	235206.38	850447.19	1.8
**. LR_136	235204.69	850451.88	1.8
**. LR_137	235202.98	850456.56	1.8
**. LR_138	235201.28	850461.25	1.8
**. LR_139	235199.58	850466.00	1.8
**. LR_140	235197.88	850470.69	1.8
**. LR_141	235196.19	850475.38	1.8
**. LR_142	235194.48	850480.06	1.8
**. LR_143	235194.25	850485.06	1.8
**. LR_144	235194.02	850489.75	1.8
**. LR_145	235194.09	850494.19	1.8
**. LR_146	235194.45	850498.88	1.8
**. LR_147	235195.98	850503.62	1.8
**. LR_148	235199.00	850508.31	1.8

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	0.	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.				

```
   0.     0.    0.1    0.1
 10.  *     0.     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 20.  *     0.     0.     0.     0.    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 30.  *     0.     0.     0.     0.    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 60.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.2    0.2
 70.  *    0.4    0.3    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.2    0.2
 80.  *    0.9    0.6    0.4    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.3
 90.  *    1.2    0.9    0.7    0.5    0.4    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.3    0.3    0.5
100.  *    1.2    0.9    0.7    0.6    0.5    0.4    0.4    0.4    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1
0.1    0.3    0.3    0.5
110.  *    1.2     1.    0.6    0.6    0.7    0.5    0.5    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.1    0.1
0.1    0.3    0.4    0.6
120.  *    1.1    0.7    0.5    0.5    0.6    0.6    0.5    0.5    0.5    0.4    0.4    0.4    0.4    0.4    0.3    0.3
0.2    0.5    0.7     1.
130.  *     1.    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.4
0.4    0.8    0.9    1.2
140.  *    0.7    0.6    0.7    0.5    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.4    0.4    0.4
0.4    0.7    0.8    0.9
150.  *    0.7    0.6    0.5    0.5    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2
0.2    0.7    0.7    0.7
160.  *    0.7     1.    0.8    0.7    0.6    0.7    0.7    0.6    0.5    0.5    0.5    0.4    0.4    0.4    0.5    0.5
0.4    0.5    0.6    0.6
170.  *    0.8    0.9    0.7    0.6    0.6    0.7    0.8    0.7    0.6    0.6    0.6    0.6    0.7    0.6    0.6    0.6
0.6    0.3    0.4    0.4

------*-------------------------------------------------------------------------------------------------------------
--------------------
MAX   *    1.2     1.    0.8    0.7    0.7    0.7    0.8    0.7    0.6    0.6    0.6    0.6    0.7    0.6    0.6    0.6
0.6    0.8    0.9    1.2
```

DEGR. * 90 110 160 160 110 160 170 170 140 170 170 170 170 170 170 170
170 130 130 130

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
REC17	REC18	REC19	REC20													
180. *	0.8	0.8	0.6	0.5	0.6	0.6	0.8	0.6	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.8
0.7	0.2	0.2	0.4													
190. *	0.6	0.7	0.6	0.7	0.8	0.9	1.	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8
0.7	0.2	0.2	0.3													
200. *	0.5	0.7	0.6	0.8	0.9	1.	1.	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7
0.7	0.1	0.1	0.2													
210. *	0.8	0.7	0.8	0.9	1.	1.	0.9	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.6	0.6
0.5	0.1	0.1	0.1													
220. *	0.9	0.6	0.7	0.9	1.	1.	0.9	0.8	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.6
0.5	0.	0.	0.1													
230. *	0.9	0.9	0.9	0.9	1.	0.9	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.4	0.3
0.2	0.	0.	0.													
240. *	0.9	0.8	1.	0.8	0.8	0.7	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4
0.3	0.	0.	0.													
250. *	0.7	0.6	0.7	0.8	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.3
0.3	0.	0.	0.													
260. *	0.6	0.6	0.5	0.6	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.3	0.2
0.2	0.	0.	0.													
270. *	0.4	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.3	0.2

```
0.2     0.     0.     0.
280.  *    0.3    0.6    0.7    0.7    0.5    0.4    0.4    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.3
0.2     0.     0.     0.
290.  *    0.4    0.7    0.7    0.6    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.3    0.3
0.1     0.     0.     0.
300.  *    0.4    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.3    0.3
0.1     0.     0.     0.
310.  *    0.5    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.3    0.3    0.2
0.1     0.     0.     0.
320.  *    0.4    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.4    0.4    0.3    0.3    0.1
0.1     0.     0.     0.
330.  *    0.2    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.3    0.2    0.2    0.2    0.1
0.     0.     0.    0.1
340.  *    0.1    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.1    0.1    0.1
0.     0.    0.1    0.1
350.  *     0.    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1     0.
0.     0.    0.1    0.1
360.  *     0.    0.1    0.1    0.1    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.
0.     0.    0.1    0.1

------*-----------------------------------------------------------------------------------------------------------------
---------------------
MAX   *    1.2     1.     1.    0.9     1.     1.     1.    0.9    0.9    0.8    0.8    0.8    0.8    0.8    0.8    0.8
0.7    0.8    0.9    1.2
DEGR. *     90    110    240    210    210    200    190    190    190    180    180    190    190    190    190    180
180    130    130    130

      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
```

```
 REC37  REC38  REC39  REC40

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.2    0.5    0.6    0.7    0.8    0.8    0.9    0.9    1.1    1.1    1.2    1.4    1.1    1.2    0.6    0.4
    0.2    0.1    0.1     0.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.2    0.5    0.6    0.7    0.8    0.8    0.9    0.9    1.1    1.1    1.2    1.4    1.1    1.2    0.6    0.4
 0.2    0.1    0.1     0.
 DEGR. *      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
 0      0      0      0
```



```
       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
 REC37  REC38  REC39  REC40

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
  10.  *    0.3    0.6    0.7    0.7    0.8    0.8    0.8    0.9     1.     1.    1.1    1.4    1.1    1.2    0.6    0.5
  0.3    0.3    0.1    0.1
  20.  *    0.4    0.5    0.6    0.6    0.6    0.7    0.7    0.8    0.8    0.8     1.    1.1    0.8    0.9    0.6    0.5
  0.5    0.4    0.2    0.2
  30.  *    0.4    0.5    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.7    0.9    0.9    0.9    0.9    0.6    0.5
  0.5    0.4    0.2    0.2
  40.  *    0.5    0.5    0.5    0.5    0.6    0.6    0.6    0.6    0.6    0.6    0.8    0.9    0.7    0.8    0.5    0.4
  0.4    0.4    0.3    0.3
```

```
 50.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.6    0.9    0.9    0.7    0.7    0.4    0.4
 0.3    0.3    0.4    0.4
 60.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.6    0.9    0.9    0.7    0.7    0.5    0.5
 0.6    0.6    0.6    0.4
 70.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.6    0.7     1.     1.    0.9     1.    0.6    1.1
 0.9    0.9    0.8    0.8
 80.  *    0.5    0.5    0.5    0.6    0.6    0.6    0.6    0.7    0.7    0.9    1.1    1.2    1.2    1.3     1.    1.2
 1.    0.9    0.9     1.
 90.  *    0.6    0.6    0.6    0.6    0.6    0.6    0.7    0.8    0.8    1.2    1.3    1.5    1.4    1.3     1.    1.1
 1.    0.9    0.9     1.
100.  *    0.6    0.6    0.6    0.7    0.7    0.8     1.     1.     1.    1.2    1.4    1.5    1.3     1.    0.9    0.8
0.7    0.6    0.5    0.6
110.  *    0.7    0.7    0.8     1.     1.     1.     1.     1.    1.1    1.3    1.3    1.4    1.2    1.2    0.6    0.5
0.6    0.5    0.7    0.8
120.  *    1.1    1.1    1.1     1.     1.    1.1    1.1    1.2    1.3    1.5    1.6    1.5     1.     1.    0.4    0.6
0.5    0.7    0.8    0.8
130.  *    1.2    1.2    1.2    1.2    1.4    1.3    1.4    1.4    1.5    1.5    1.3    1.2    0.7    0.7    0.6    0.6
0.7    0.9    0.7    0.9
140.  *    0.9    0.9     1.    0.9    0.9     1.    1.1    1.3    1.5    1.5    1.4    1.2    0.8    0.7    0.8    0.6
0.7    0.6    0.8    0.8
150.  *    0.7    0.7    0.9    0.9     1.    1.1    1.2    1.4    1.4    1.5    1.6    1.5    0.9    0.7    0.7    0.6
0.6    0.8    0.7    0.7
160.  *    0.6    0.6    0.8    0.8    0.7    0.8    1.1    1.2    1.1    1.2    1.3    1.2    0.6    0.5    0.5    0.8
0.6    0.7    0.7    0.7
170.  *    0.4    0.4    0.4    0.5    0.5    0.5    0.7    0.8    0.8     1.    0.9     1.    0.6    0.4    0.5    0.5
0.7    0.7    0.7    0.7
180.  *    0.4    0.4    0.4    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.6    0.7    0.5    0.6    0.5    0.7
0.7    0.7    0.7    0.7
190.  *    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.5    0.6    0.6    0.7    0.4    0.5    0.5    0.8
0.7    0.7    0.7    0.7
200.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.6    0.6    0.5    0.5    0.7    0.8
0.8    0.8    0.8    0.8
210.  *    0.1    0.2    0.2    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.7    0.5    0.6    0.8    0.8
0.8    0.9    0.9    0.9
220.  *    0.1    0.1    0.1    0.1    0.2    0.2    0.3    0.4    0.4    0.4    0.4    0.5    0.6    0.6    0.9     1.
1.     1.     1.     1.
230.  *     0.     0.     0.    0.1    0.1    0.1    0.1    0.2    0.2    0.4    0.4    0.5    0.5    0.7    0.9     1.
1.     1.     1.     1.
240.  *     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.2    0.2    0.5    0.5    0.8     1.
1.     1.    0.9    0.9
```

```
 250.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.3    0.7    0.8
 0.8    0.8    0.8    0.8
 260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.5
 0.5    0.5    0.5    0.5
 270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3
 0.3    0.3    0.3    0.2
 280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 310.  *     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.2    0.2    0.2    0.     0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 320.  *     0.     0.     0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.3    0.3    0.4    0.1    0.2    0.     0.     0.1
 0.     0.     0.     0.
 330.  *    0.1    0.1    0.1    0.2    0.2    0.2    0.3    0.4    0.5    0.6    0.6    0.7    0.3    0.3    0.     0.     0.1
 0.     0.     0.     0.
 340.  *    0.1    0.2    0.2    0.4    0.4    0.6    0.7    0.7    0.8    0.9    1.1    1.2    0.6    0.8    0.2    0.     0.1
 0.     0.     0.     0.
 350.  *    0.1    0.4    0.5    0.6    0.7    0.8    0.8    0.9     1.    1.2    1.2    1.4     1.     1.    0.4    0.2
 0.1     0.     0.     0.
 360.  *    0.2    0.5    0.6    0.7    0.8    0.8    0.9    0.9    1.1    1.1    1.2    1.4    1.1    1.2    0.6    0.4
 0.2    0.1    0.1     0.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.2    1.2    1.2    1.2    1.4    1.3    1.4    1.4    1.5    1.5    1.6    1.5    1.4    1.3     1.    1.2
 1.     1.     1.     1.
 DEGR. *    130    130    130    130    130    130    130    130    130    120    120     90     90     80     80     80
 80    220    220     80
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.1	1.1	1.1	1.1	1.1	1.1
10.	*	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.1	1.1	1.1	1.1	1.1	1.2
20.	*	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.1	0.	0.	1.2	1.2	1.2	1.2	1.2	1.2
30.	*	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.3	1.3	1.3	1.3	1.3	1.3
40.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.5	1.5	1.5	1.5	1.5	1.5
50.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.7	1.6	1.6	1.6	1.6	1.7
60.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	1.9	1.9	1.9	1.8	2.1	2.1
70.	*	0.9	0.9	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	1.7	1.9	1.9	2.	2.1	2.1
80.	*	1.	1.	0.9	1.	1.	1.1	1.1	1.1	1.1	1.1	1.1	1.	0.9	0.9	1.1	1.1	1.1	1.2	1.2	1.2
90.	*	1.	0.9	0.9	0.9	1.	1.	0.9	0.9	1.	1.	1.	1.	1.	1.1	0.5	0.6	0.6	0.6	0.6	0.6
100.	*	0.7	0.8	0.8	0.8	0.9	0.9	0.9	1.	1.	1.	1.	1.	1.	1.	0.2	0.2	0.2	0.2	0.3	0.3
110.	*	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.	0.9	0.1	0.1	0.1	0.2	0.2	0.2
120.	*	0.9	0.9	0.9	0.9	1.	1.	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.1	0.1	0.1	0.1	0.2	0.2
130.	*	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.	0.	0.	0.1	0.1	0.1
140.	*	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.7	0.	0.	0.	0.	0.	0.

150.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.	0.	
0.	0.	0.	0.															
160.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.	0.	
0.	0.	0.	0.															
170.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.	0.	
0.	0.	0.	0.															
180.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.3	0.	0.	
0.	0.	0.	0.															
190.	*	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.6	0.6	0.3	0.	0.	
0.	0.	0.	0.															
200.	*	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.6	0.5	0.3	0.	0.	
0.	0.1	0.1	0.1															
210.	*	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.6	0.4	0.	0.1	
0.1	0.1	0.2	0.2															
220.	*	1.	1.	1.	1.	1.	1.	1.	1.	0.9	0.8	0.8	0.7	0.6	0.3	0.	0.1	
0.1	0.2	0.2	0.2															
230.	*	1.	1.	1.	1.	1.	0.9	0.9	0.9	0.9	0.7	0.6	0.5	0.4	0.3	0.2	0.2	
0.2	0.2	0.2	0.4															
240.	*	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.7	0.5	0.5	0.4	0.3	0.2	0.3	0.4	
0.5	0.5	0.5	0.7															
250.	*	0.8	0.8	0.8	0.6	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.2	0.1	0.6	0.7	
0.9	0.9	1.	1.2															
260.	*	0.5	0.5	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.	1.	1.1	
1.2	1.3	1.5	1.5															
270.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.	1.2	1.2
1.4	1.5	1.6	1.7															
280.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	1.1	1.3	
1.3	1.5	1.5	1.6															
290.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	1.1	1.2	
1.3	1.4	1.4	1.5															
300.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	1.	1.1	
1.2	1.2	1.3	1.3															
310.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.1	
1.1	1.2	1.2	1.2															
320.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.9	1.	
1.1	1.1	1.1	1.1															
330.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	
1.1	1.1	1.1	1.															
340.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.1	
1.2	1.2	1.1	1.1															

```
 350.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.1    1.1
 1.2    1.2    1.1    1.1
 360.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.1    1.1
 1.1    1.1    1.1    1.1

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *     1.     1.     1.     1.     1.    1.1    1.1    1.1    1.1    1.1    1.1     1.     1.    1.1    1.9    1.9
 1.9     2.    2.1    2.1
 DEGR. *     80     80    220     80     80     80     80     80     80     80     80     80     90     90     60     60
 60     70     60     60
```



```
       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
 REC77  REC78  REC79  REC80

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *     1.    1.1    1.1     1.     1.    1.1    1.1    1.2    1.2    1.1     1.     1.    0.9    0.9    0.9     1.
    1.     1.     1.    0.9
  10.  *    1.2    1.1    1.2    1.2    1.2    1.3    1.3    1.2    1.2    1.1    1.1     1.    0.6    0.9    1.1    1.1
  1.    1.1     1.     1.
  20.  *    1.2    1.2    1.2    1.3    1.3    1.3    1.3    1.3    1.2    1.1     1.    0.6    0.5    1.1    1.1    1.1
  1.1    1.1     1.     1.
  30.  *    1.3    1.4    1.4    1.4    1.4    1.4    1.4    1.3    1.2    1.1    0.8    0.6    0.5    1.1    1.1    1.2
  1.1     1.    1.1     1.
  40.  *    1.5    1.5    1.5    1.5    1.5    1.4    1.4    1.5    1.3    1.3    0.8    0.7    0.8     1.    1.1    1.1
  1.1    1.1     1.     1.
```

```
 50.  *    1.7    1.6    1.6    1.5    1.6    1.7    1.8    1.9    1.6    1.4    1.    0.7    0.9    1.    1.    1.1
 1.1    1.1    1.1    1.1
 60.  *    2.1    2.     2.     2.2    2.2    2.     2.     1.9    1.6    1.3    0.9    0.9    0.8    0.8    0.8    0.9
 1.1    1.     1.     1.
 70.  *    2.1    2.     2.     2.     1.9    1.8    1.8    1.6    1.4    1.2    0.9    0.9    0.9    0.5    0.7    0.8
 0.9    0.9    0.8    0.8
 80.  *    1.3    1.2    1.3    1.4    1.4    1.1    1.1    1.     1.     0.7    0.5    0.4    0.4    0.2    0.3    0.4
 0.5    0.5    0.5    0.4
 90.  *    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.3    0.2    0.2    0.2    0.     0.1    0.1
 0.2    0.2    0.2    0.2
100.  *    0.4    0.3    0.4    0.4    0.5    0.4    0.4    0.4    0.4    0.5    0.4    0.4    0.4    0.     0.     0.1
0.1    0.1    0.1    0.1
110.  *    0.2    0.3    0.3    0.3    0.3    0.3    0.4    0.5    0.4    0.3    0.3    0.3    0.3    0.     0.     0.1
0.1    0.1    0.1    0.1
120.  *    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.3    0.3    0.3    0.     0.     0.
0.1    0.1    0.1    0.1
130.  *    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.1    0.1    0.2    0.2    0.3    0.     0.     0.
0.1    0.1    0.     0.
140.  *    0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.1    0.     0.     0.
0.     0.     0.     0.
150.  *    0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.     0.
0.     0.     0.     0.
160.  *    0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
170.  *    0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
180.  *    0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.1
0.     0.     0.     0.
190.  *    0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3    0.3    0.2
0.3    0.1    0.1    0.
200.  *    0.1    0.1    0.1    0.1    0.2    0.1    0.1    0.1    0.     0.     0.     0.     0.     0.3    0.3    0.3
0.4    0.3    0.3    0.1
210.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.     0.     0.     0.     0.4    0.3    0.3
0.4    0.4    0.3    0.3
220.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.     0.     0.     0.     0.4    0.4    0.5
0.4    0.4    0.4    0.4
230.  *    0.4    0.3    0.4    0.4    0.4    0.3    0.4    0.3    0.2    0.1    0.     0.     0.     0.3    0.2    0.3
0.4    0.3    0.3    0.3
240.  *    0.7    0.6    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.4    0.2    0.1    0.     0.3    0.4    0.6
0.7    0.7    0.6    0.5
```

```
 250.  *    1.2    1.1    1.2    1.2    1.3    1.2    1.2    1.2    1.1    0.7    0.5    0.3    0.3    0.7    0.7    0.8
 0.9    0.8    0.8    0.9
 260.  *    1.6    1.6    1.7    1.8    1.8    1.8    1.8    1.8    1.6    1.4     1.    0.9    0.6     1.    0.9     1.
 1.    0.9    1.1    1.1
 270.  *    1.7    1.8    1.8    1.8    1.9    1.8    1.8    1.8    1.7    1.5    1.2     1.    0.9    0.8    0.9     1.
 1.     1.    1.2    1.3
 280.  *    1.6    1.5    1.7    1.7    1.7    1.7    1.7    1.7    1.6    1.5    1.3     1.    0.9    0.8    0.8    0.7
 1.     1.    1.1    1.1
 290.  *    1.5    1.5    1.5    1.5    1.5    1.5    1.5    1.5    1.5    1.4    1.1     1.    0.9    0.5    0.5    0.9
 1.    1.2    1.2    1.1
 300.  *    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.2    1.1    0.9    0.9    0.6     1.    0.9
 1.2    1.2    1.2    1.3
 310.  *    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.1    0.9    0.9    0.8     1.     1.    1.2
 1.2    1.1    1.1    1.1
 320.  *    1.2    1.1    1.1    1.2    1.2    1.1    1.1    1.1    1.1    1.1    0.9    0.8    0.8    0.9     1.    1.1
 1.     1.     1.     1.
 330.  *     1.    1.1    1.1     1.     1.    1.1     1.    1.1    1.1    1.1    0.8    0.9    0.8    0.9    0.9     1.
 1.     1.     1.     1.
 340.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.9    0.8    0.8     1.     1.     1.
 1.     1.     1.     1.
 350.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.     1.    0.9    0.8    0.9    0.9     1.
 1.     1.     1.    0.9
 360.  *     1.    1.1    1.1     1.     1.    1.1    1.1    1.2    1.2    1.1     1.     1.    0.9    0.9    0.9     1.
 1.     1.     1.    0.9

 ------*-----------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *    2.1     2.     2.    2.2    2.2     2.     2.    1.9    1.7    1.5    1.3     1.    0.9    1.1    1.1    1.2
 1.2    1.2    1.2    1.3
 DEGR. *     60     60     60     60     60     60     60     50    270    270    280      0      0     20     10     30
 300    290    270    270
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88	REC89	REC90	REC91	REC92	REC93	REC94	REC95	REC96	REC97	REC98	REC99	REC100
.	*	0.9	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.
10.	*	1.	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.5	0.2	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.1
20.	*	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.5	0.3	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1
30.	*	1.	0.9	0.9	0.9	0.9	0.8	0.8	0.9	0.7	0.5	0.3	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
40.	*	0.9	0.9	0.9	0.9	0.9	1.	0.8	0.9	0.7	0.4	0.3	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
50.	*	1.1	1.	1.	0.9	0.9	0.8	0.8	0.7	0.6	0.4	0.3	0.	0.	0.1	0.1	0.2	0.2	0.2	0.2	0.2
60.	*	1.	0.9	0.9	0.9	0.8	0.8	0.6	0.7	0.6	0.4	0.4	0.1	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.4
70.	*	0.7	0.6	0.7	0.6	0.6	0.7	0.6	0.6	0.5	0.3	0.3	0.2	0.3	0.4	0.5	0.5	0.6	0.6	0.6	0.7
80.	*	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.5	0.4	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.7	0.7	0.9	0.9
90.	*	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.	0.	0.3	0.4	0.5	0.6	0.7	0.8	0.8	0.9	1.
100.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.	0.	0.3	0.4	0.6	0.6	0.8	0.8	0.9	0.9	1.1
110.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.2	0.4	0.5	0.6	0.7	0.9	0.9	0.9	1.1
120.	*	0.1	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.2	0.4	0.5	0.6	0.7	0.7	0.8	0.8	0.9
130.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.	0.	0.2	0.4	0.5	0.7	0.7	0.8	0.8	0.8	0.9
140.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.	0.	0.2	0.5	0.6	0.7	0.7	0.7	0.7	0.7	0.8

```
150.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.2    0.4    0.7    0.7    0.7
0.7    0.7    0.7    0.9
160.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.3    0.6    0.7    0.8    0.8
0.8    0.7    0.7     1.
170.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.3    0.6    0.7    0.8    0.8
0.7    0.7    0.7    1.1
180.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.5    0.7    0.8    0.8    0.8
0.8    0.7    0.7    1.1
190.  *     0.     0.    0.1     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.5    0.7    0.8    0.8    0.8
0.8    0.8    0.9    1.3
200.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.7    0.8    0.8    0.8    0.8
0.8    0.8     1.    1.3
210.  *    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.8    0.9    0.8    0.8    0.8
0.8    0.9    1.1    1.4
220.  *    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.1     1.    1.1     1.     1.    1.1
1.1    1.2    1.4    1.7
230.  *    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.4    0.3    0.3    0.2    1.2    1.2    1.2    1.2    1.2
1.3    1.4    1.5     2.
240.  *    0.5    0.4    0.5    0.5    0.5    0.5    0.5    0.7    0.6    0.7    0.6    1.4    1.4    1.3    1.3    1.4
1.5    1.6    1.9    2.1
250.  *    0.9    0.8    0.9    0.9    0.8    0.9     1.    1.1    1.1    1.2     1.    1.2    1.2    1.2    1.3    1.4
1.5    1.6    1.7    1.7
260.  *    1.1    1.3    1.4    1.3    1.2    1.2    1.3    1.5    1.5    1.5    1.4    0.8    0.8    0.9    0.9    0.9
1.     1.    1.1    1.2
270.  *    1.2    1.2    1.4    1.4    1.4    1.2    1.2    1.4    1.4    1.4    1.3    0.3    0.4    0.4    0.4    0.4
0.4    0.4    0.5    0.6
280.  *    1.2    1.2    1.3    1.3    1.2    1.3    1.2    1.3    1.2    1.2    1.1    0.1    0.2    0.2    0.2    0.2
0.2    0.2    0.2    0.3
290.  *    1.1    1.2    1.1    1.1    1.1     1.     1.    1.1    1.1     1.    0.9    0.1    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.2
300.  *    1.2    1.2    1.1    1.1     1.     1.    0.9    0.9     1.     1.    0.8    0.1    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.2
310.  *    1.1     1.    1.1     1.     1.    0.9    0.8    0.8    0.9    0.9    0.7     0.    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
320.  *     1.    0.9     1.    0.9    0.8    0.7    0.7    0.7    0.7    0.7    0.5     0.     0.     0.     0.     0.
0.     0.     0.    0.1
330.  *    0.9    0.9    0.9    0.9    0.8    0.7    0.7    0.7    0.7    0.7    0.4     0.     0.     0.     0.     0.
0.     0.     0.     0.
340.  *    0.9    0.9    0.9    0.8    0.7    0.7    0.7    0.7    0.7    0.6    0.4     0.     0.     0.     0.     0.
0.     0.    0.1    0.1
```

```
 350.  *    0.9    0.9    0.9    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.3     0.     0.     0.     0.     0.
 0.     0.     0.    0.1
 360.  *    0.9    0.9    0.8    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.3     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.2    1.3    1.4    1.4    1.4    1.3    1.3    1.5    1.5    1.5    1.4    1.4    1.4    1.3    1.3    1.4
 1.5    1.6    1.9    2.1
 DEGR. *    270    260    260    270    270    280    260    260    260    260    260    240    240    240    240    240
 240    240    240    240
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

```
WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC101 REC102 REC103 REC104 REC105 REC106 REC107 REC108 REC109 REC110 REC111 REC112 REC113 REC114 REC115 REC116
REC117 REC118 REC119 REC120

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.6    0.6    0.5    0.4    0.4
   0.6    0.7    0.5    0.6
  10.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.5    0.4    0.4    0.4    0.5
  0.7    0.7    0.7    1.1
  20.  *    0.1    0.1    0.1    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.5    0.5    0.6    0.6    0.8
  0.8    0.9    0.8    1.1
  30.  *    0.1    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.7    0.8    0.7    0.7    0.9
  0.8    0.8    1.1    1.1
  40.  *    0.1    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.8    0.8    0.8    0.8    0.8
  0.7    0.9    0.9     1.
```

```
 50.  *    0.3    0.3    0.3    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.9     1.    0.9    0.8    0.8
 0.8    0.7    0.7    0.8
 60.  *    0.5    0.7    0.7    0.8    0.8    0.6    0.6    0.6    0.6    0.6    0.6    1.1    1.1    0.7    0.5    0.6
 0.6    0.6    0.5    0.6
 70.  *    0.9     1.    1.1    1.3    1.4    1.2    1.2    1.3    1.3    1.3    1.3    0.6    0.4    0.4    0.5    0.6
 0.5    0.6    0.6    0.6
 80.  *    1.2    1.4    1.6    1.7    1.8    1.7    1.7    1.7    1.7    1.7    1.8    0.4    0.3    0.2    0.4    0.4
 0.4    0.4    0.4    0.5
 90.  *    1.3    1.5    1.6    1.7    1.8    1.7    1.9     2.     2.     2.     2.    0.3    0.3    0.4    0.4    0.4
 0.4    0.4    0.4    0.4
100.  *    1.4    1.6    1.8    1.8    1.9    1.7    1.8    1.8    1.8    1.8    1.8    0.3    0.3    0.4    0.4    0.4
0.5    0.5    0.5    0.5
110.  *    1.4    1.6    1.7    1.7    1.8    1.6    1.5    1.6    1.5    1.6    1.5    0.3    0.4    0.4    0.4    0.5
0.5    0.5    0.4    0.5
120.  *    1.3    1.4    1.3    1.3    1.4    1.4    1.4    1.4    1.4    1.4    1.4    0.4    0.4    0.4    0.5    0.5
0.6    0.5    0.5    0.6
130.  *    1.3    1.2    1.2    1.2    1.3    1.3    1.3    1.3    1.3    1.3    1.3    0.3    0.3    0.3    0.4    0.4
0.5    0.6    0.6    0.6
140.  *    1.2    1.2    1.2    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.2    0.2    0.2    0.3    0.4    0.4
0.5    0.5    0.4    0.5
150.  *    1.2    1.2    1.2    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.2    0.1    0.1    0.2    0.2    0.3
0.4    0.4    0.4    0.5
160.  *    1.2    1.2    1.2    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.2     0.    0.1    0.1    0.1    0.2
0.2    0.3    0.3    0.4
170.  *    1.2    1.2    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.6    1.2     0.    0.     0.     0.    0.1
0.1    0.1    0.2    0.3
180.  *    1.2    1.2    1.3    1.3    1.3    1.3    1.4    1.5    1.6    1.5     1.    0.    0.     0.     0.     0.
0.    0.1    0.1    0.2
190.  *    1.3    1.2    1.3    1.3    1.5    1.5    1.6    1.6    1.5    1.5    0.8    0.    0.     0.     0.     0.
0.     0.     0.    0.1
200.  *    1.4    1.5    1.6    1.6    1.7    1.6    1.5    1.5    1.5    1.2    0.7    0.    0.     0.     0.     0.
0.     0.     0.    0.1
210.  *    1.4    1.6    1.6    1.6    1.5    1.5    1.5    1.5    1.2     1.    0.7    0.    0.     0.     0.     0.
0.     0.     0.     0.
220.  *    1.8    1.7    1.7    1.7    1.6    1.6    1.4    1.6    1.3     1.     1.    0.    0.     0.     0.     0.
0.     0.     0.     0.
230.  *    2.1     2.    1.9    1.9    1.9    1.7    1.6    1.5    1.3    1.2    0.9    0.    0.     0.     0.     0.
0.     0.     0.     0.
240.  *    2.1    2.1    2.3    2.3    2.1    1.8    1.7    1.4    1.5    1.2    0.9    0.    0.     0.     0.     0.
0.     0.     0.     0.
```

```
 250.  *    1.8     2.    1.9    1.9    1.9    1.5    1.3    1.2    1.2    1.2    0.9    0.2    0.1    0.1    0.1     0.
 0.     0.     0.     0.
 260.  *    1.2    1.1    1.1    1.2    1.2    0.9    0.8    0.8    0.6    0.7    0.6    0.5    0.4    0.3    0.3    0.2
 0.1    0.1    0.1     0.
 270.  *    0.6    0.6    0.6    0.6    0.6    0.3    0.4    0.4    0.6    0.5    0.5    0.8    0.7    0.6    0.5    0.4
 0.3    0.3    0.1    0.1
 280.  *    0.3    0.4    0.4    0.4    0.4    0.3    0.4    0.4    0.4    0.4    0.5    0.9    0.7    0.7    0.6    0.5
 0.5    0.4    0.3    0.3
 290.  *    0.2    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.3    0.5    0.7    0.7    0.7    0.6    0.6
 0.5    0.4    0.4    0.5
 300.  *    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.7    0.7    0.6    0.6    0.5
 0.4    0.4    0.4    0.5
 310.  *    0.1    0.1    0.1    0.1    0.2    0.1    0.3    0.3    0.2    0.2    0.3    0.8    0.7    0.6    0.5    0.4
 0.4    0.4    0.4    0.5
 320.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.    0.1    0.2    0.2    0.8    0.7    0.5    0.5    0.4
 0.3    0.3    0.4    0.5
 330.  *     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.    0.2    0.7    0.5    0.5    0.5    0.4
 0.3    0.4    0.3    0.4
 340.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.6    0.6    0.5    0.5    0.3
 0.4    0.4    0.4    0.6
 350.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.6    0.6    0.6    0.6    0.5
 0.5    0.6    0.6    0.6
 360.  *     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.6    0.6    0.5    0.4    0.4
 0.6    0.7    0.5    0.6

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    2.1    2.1    2.3    2.3    2.1    1.8    1.9     2.     2.     2.     2.    1.1    1.1    0.9    0.8    0.9
 0.8    0.9    1.1    1.1
 DEGR. *    230    240    240    240    240    240     90     90     90     90     90     60     60     50     40     30
 20     20     30     10
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC121	REC122	REC123	REC124	REC125	REC126	REC127	REC128	REC129	REC130	REC131	REC132	REC133	REC134	REC135	REC136	REC137	REC138	REC139	REC140
.	*	0.6	0.6	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.4	0.6	0.6	0.6	0.8	0.8	0.9	1.	1.	1.1	1.2
10.	*	1.1	1.2	1.2	1.1	1.3	1.2	1.	1.	1.	0.3	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.8
20.	*	1.1	1.1	1.2	1.2	1.1	1.1	0.9	0.9	0.9	0.2	0.3	0.3	0.3	0.3	0.5	0.5	0.5	0.6	0.7	0.7
30.	*	1.1	1.2	1.2	1.	1.	0.8	0.8	0.7	0.5	0.1	0.1	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.7
40.	*	0.9	1.	0.9	0.9	0.8	0.7	0.6	0.5	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.4	0.4
50.	*	0.7	0.6	0.6	0.7	0.7	0.6	0.6	0.5	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3
60.	*	0.6	0.5	0.6	0.6	0.6	0.6	0.5	0.4	0.2	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
70.	*	0.4	0.4	0.4	0.5	0.4	0.5	0.4	0.3	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2
80.	*	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.3	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1
90.	*	0.4	0.4	0.6	0.5	0.4	0.4	0.2	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1
100.	*	0.5	0.6	0.6	0.5	0.4	0.4	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1
110.	*	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.2
120.	*	0.6	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.3	0.3
130.	*	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.2	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.3	0.3	0.4
140.	*	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.	0.	0.	0.	0.1	0.1	0.2	0.3	0.3	0.5	0.6	0.6

```
150.  *    0.5    0.4    0.4    0.4    0.3    0.3    0.2    0.1    0.     0.     0.     0.2    0.2    0.2    0.3    0.5
0.6    0.7    0.8    0.9
160.  *    0.4    0.4    0.4    0.3    0.3    0.2    0.2    0.1    0.     0.     0.1    0.2    0.2    0.2    0.4    0.6
0.8     1.     1.    1.2
170.  *    0.3    0.3    0.2    0.2    0.2    0.2    0.1    0.1    0.     0.     0.1    0.2    0.2    0.2    0.5    0.8
0.9    1.1    1.3    1.5
180.  *    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.     0.     0.1    0.2    0.2    0.3    0.6    0.8
0.9     1.    1.2    1.4
190.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.     0.     0.     0.1    0.3    0.3    0.3    0.6    0.9
1.     1.    1.2    1.3
200.  *    0.1    0.1    0.1    0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.3    0.4    0.8    0.9
0.9    0.9    1.2    1.2
210.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.3    0.4    0.4    0.8    0.8
0.8    0.8    1.1    1.1
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.4    0.4    0.4    0.8    0.8
0.8    0.8     1.     1.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.4    0.4    0.4    0.8    0.8
0.8    0.7     1.     1.
240.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.3    0.4    0.4    0.4    0.8    0.8
0.7    0.8     1.     1.
250.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.3    0.4    0.4    0.4    0.8    0.8
0.7    0.8     1.     1.
260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3    0.4    0.4    0.4    0.4    0.8    0.8
0.7    0.9    1.1    1.1
270.  *    0.1    0.1    0.1    0.     0.     0.     0.     0.     0.     0.3    0.4    0.4    0.4    0.5    0.9    0.9
0.9     1.    1.2    1.3
280.  *    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.4    0.5    0.5    0.5    0.7    0.9     1.
1.1    1.3    1.4    1.4
290.  *    0.4    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.4    0.5    0.5    0.6    0.8    1.1    1.2
1.3    1.5    1.6    1.5
300.  *    0.5    0.5    0.5    0.4    0.3    0.2    0.2    0.2    0.1    0.5    0.6    0.6    0.8     1.    1.2    1.2
1.3    1.5    1.4    1.4
310.  *    0.5    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.6    0.6    0.7    0.8    1.1    1.4    1.4
1.4    1.5    1.4    1.5
320.  *    0.5    0.5    0.5    0.5    0.5    0.3    0.3    0.3    0.2    0.6    0.6    0.6    0.8    1.1    1.2    1.3
1.3    1.6    1.5    1.4
330.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.6    0.8    0.8     1.    1.2    1.4    1.6
1.7    1.6    1.5    1.6
340.  *    0.6    0.6    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.6    0.7    0.7    0.8     1.    1.2    1.3
1.3    1.4    1.3    1.4
```

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 350.  *    0.6    0.6    0.6    0.6    0.7    0.7    0.7    0.7    0.7    0.3    0.5    0.6    0.6    0.8    0.9    0.9
 1.1    1.1    1.1    1.2
 360.  *    0.6    0.6    0.8    0.8    0.8    0.8    0.8    0.9    0.9    0.4    0.6    0.6    0.6    0.8    0.8    0.9
 1.     1.    1.1    1.2

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.1    1.2    1.2    1.2    1.3    1.2     1.     1.     1.    0.6    0.8    0.8     1.    1.2    1.4    1.6
 1.7    1.6    1.6    1.6
 DEGR. *     10     10     10     20     10     10     10     10     10    310    330    330    330    330    310    330
 330    320    290    330
```

FF PAGE 13

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) REC141	REC142	REC143	REC144	REC145	REC146
.	* 0.7	0.6	0.6	0.6	0.7	0.9
10.	* 0.6	0.5	0.5	0.6	0.7	1.
20.	* 0.4	0.5	0.6	0.7	0.7	1.
30.	* 0.5	0.5	0.5	0.7	0.9	1.1
40.	* 0.5	0.5	0.5	0.6	0.8	1.
50.	* 0.3	0.3	0.4	0.5	0.7	0.8
60.	* 0.2	0.2	0.2	0.5	0.5	0.6
70.	* 0.1	0.1	0.1	0.2	0.2	0.4
80.	* 0.	0.	0.	0.	0.1	0.2
90.	* 0.	0.	0.	0.	0.	0.
100.	* 0.	0.	0.	0.	0.	0.
110.	* 0.	0.	0.	0.	0.	0.
120.	* 0.	0.	0.	0.	0.	0.

130.	*	0.1	0.	0.	0.	0.	0.
140.	*	0.2	0.1	0.	0.	0.	0.
150.	*	0.5	0.2	0.2	0.	0.	0.
160.	*	0.9	0.5	0.3	0.2	0.1	0.
170.	*	1.2	0.9	0.7	0.6	0.3	0.1
180.	*	1.4	1.1	0.9	0.7	0.6	0.4
190.	*	1.3	1.2	1.	0.8	0.7	0.6
200.	*	1.2	1.1	0.9	0.8	0.8	0.5
210.	*	1.2	1.	0.8	0.8	0.6	0.4
220.	*	1.1	0.9	0.8	0.6	0.6	0.4
230.	*	1.1	0.8	0.8	0.6	0.5	0.3
240.	*	1.1	0.8	0.8	0.5	0.5	0.3
250.	*	1.1	0.8	0.8	0.6	0.6	0.6
260.	*	1.1	1.	1.	0.7	1.	0.9
270.	*	1.3	1.2	1.	1.	1.	1.
280.	*	1.4	1.3	0.9	1.	0.9	0.7
290.	*	1.4	1.2	0.9	1.	0.8	0.6
300.	*	1.5	1.1	0.9	0.7	0.5	0.4
310.	*	1.3	1.	0.8	0.6	0.6	0.5
320.	*	1.3	1.1	0.8	0.5	0.6	0.7
330.	*	1.4	1.	0.6	0.5	0.5	0.8
340.	*	1.1	0.5	0.3	0.5	0.5	0.7
350.	*	0.9	0.5	0.5	0.5	0.6	0.8
360.	*	0.7	0.6	0.6	0.6	0.7	0.9
MAX	*	1.5	1.3	1.	1.	1.	1.1
DEGR.	*	300	280	190	270	260	30

THE HIGHEST CONCENTRATION OF 2.30 ppm OCCURRED AT RECEPTOR REC103.

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*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/3/2012 5:38:28 PM
** File: F:\2975 FirstLight\Microscale\Worst\34 Dean Longmeadow & Owen LOS&ADT\2012EXSA.ou2
**
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: First Light-Taunton-Dean, Longmeadow & Owen EX SAT RUN: CAL3QHC RUN

DATE : 12/ 3/12
TIME : 17:38:26

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE
VPH EF H W V/C QUEUE	*	X1	Y1	X2	Y2	*	(M)		
	*	(DEG)	(G/MI)	(M)	(M)	(VEH)			
1. Dean EB LL	*	235106.84	850497.38	235156.62	850512.50	*	52.	73.	AG
13. 8.7 0.0 9.0									
2. Dean EB LL QUEUE	*	235156.62	850512.50	235151.38	850510.88	*	5.	253.	AG
127. 100.0 0.0 3.0 0.87 0.9									
3. Dean EB TR	*	235066.06	850482.19	235155.91	850506.75	*	93.	75.	AG

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 890.   8.7   0.0   13.4
 4. Dean EB TR QUEUE                    *  235155.91    850506.75   235078.91    850485.69 *      80.   255. AG
 189. 100.0   0.0    7.4 0.94  13.3
 5. Dean WB LL                          *  235225.55    850536.69   235185.14    850524.44 *      42.   253. AG
 266.   8.7   0.0    9.4
 6. Dean WB LL QUEUE                    *  235185.14    850524.44   235334.94    850569.88 *     157.    73. AG
 111. 100.0   0.0    3.4 1.12  26.1
 7. Dean WB TR                          *  235275.70    850557.25   235185.14    850530.19 *      95.   253. AG
 911.   8.7   0.0   13.4
 8. Dean WB TR QUEUE                    *  235185.14    850530.19   235231.64    850544.06 *      49.    73. AG
 144. 100.0   0.0    7.4 0.58   8.1
 9. Owen NB LL                          *  235207.16    850428.06   235179.00    850508.50 *      85.   341. AG
 53.   8.7   0.0    9.7
10. Owen NB LL QUEUE                    *  235179.00    850508.50   235181.62    850501.00 *       8.   161. AG
101. 100.0   0.0    3.7 0.14   1.3
11. Owen NB T                           *  235208.59    850429.88   235181.17    850508.88 *      84.   341. AG
232.   8.7   0.0    9.7
12. Owen NB T QUEUE                     *  235181.17    850508.88   235192.58    850476.00 *      35.   161. AG
101. 100.0   0.0    3.7 0.61   5.8
13. Owen NB R                           *  235207.52    850436.38   235189.47    850493.75 *      60.   343. AG
334.   8.7   0.0    9.7
14. Owen NB R QUEUE                     *  235189.47    850493.75   235207.27    850437.12 *      59.   163. AG
101. 100.0   0.0    3.7 0.88   9.9
15. Longmeadow SB L                     *  235147.36    850577.25   235162.05    850535.25 *      44.   161. AG
205.   8.7   0.0    9.0
16. Longmeadow SB L QUEUE               *  235162.05    850535.25   235152.05    850564.31 *      31.   341. AG
101. 100.0   0.0    3.0 0.54   5.1
17. Longmeadow SB TR                    *  235134.16    850612.38   235159.88    850533.06 *      83.   162. AG
267.   8.7   0.0    9.0
18. Longmeadow SB TR QUEUE              *  235159.88    850533.06   235147.38    850571.44 *      40.   342. AG
101. 100.0   0.0    3.0 0.70   6.7
19. Dean EB OUTBOUND                    *  235195.64    850518.06   235273.02    850547.94 *      83.    69. AG
1350.   8.7   0.0   13.4
20. Dean WB OUTBOUND                    *  235156.41    850522.00   235064.98    850493.25 *      96.   253. AG
771.   8.7   0.0   13.4
21. Longmeadow NB OUTBOUND              *  235170.09    850535.00   235137.33    850611.62 *      83.   337. AG
462.   8.7   0.0    9.0
22. Owen SB OUTBOUND                    *  235175.48    850492.88   235201.41    850426.62 *      71.   159. AG
588.   8.7   0.0    9.7
23. EBL                                 *  235157.16    850512.56   235169.77    850534.62 *      25.    30. AG
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   13.   9.7   0.0    9.0
   24. EBT                          *  235156.48    850506.94   235194.47    850517.81 *      40.     74. AG
  811.   8.7   0.0   12.0
   25. EBR                          *  235146.28    850504.06   235174.59    850494.12 *      30.    109. AG
   79.  10.8   0.0    9.0
   26. WBL                          *  235183.81    850524.38   235172.95    850497.75 *      29.    202. AG
  266.   9.7   0.0    9.0
   27. WBT                          *  235184.27    850530.12   235156.48    850522.06 *      29.    254. AG
  694.   8.7   0.0   12.0
   28. WBR                          *  235184.27    850529.44   235168.45    850535.38 *      17.    291. AG
  217.  10.8   0.0    9.0
   29. NBL                          *  235178.67    850509.50   235156.05    850521.88 *      26.    299. AG
   53.   9.7   0.0    9.0
   30. NBT                          *  235180.75    850510.00   235170.09    850534.50 *      27.    336. AG
  232.   8.7   0.0    9.0
   31. NBR                          *  235188.33    850495.06   235198.97    850518.94 *      26.     24. AG
  334.  10.8   0.0    9.0
   32. SBL                          *  235162.09    850534.69   235188.55    850516.94 *      32.    124. AG
  205.   9.7   0.0    9.0
   33. SBT                          *  235159.89    850532.50   235173.73    850497.75 *      37.    158. AG
  243.   8.7   0.0    9.0
   34. SBR                          *  235160.44    850532.31   235155.61    850521.56 *      12.    204. AG
   24.  10.8   0.0    9.0
```


JOB: First Light-Taunton-Dean, Longmeadow & Owen EX SAT RUN: CAL3QHC RUN

DATE : 12/ 3/12
TIME : 17:38:26

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	* CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Dean EB LL QUEUE	* 120	113	4.0	13	1900	50.22	3	3

4. Dean EB TR QUEUE	*	120	84	4.0	890	1900	50.22	3	3
6. Dean WB LL QUEUE	*	120	99	4.0	266	1900	50.22	3	3
8. Dean WB TR QUEUE	*	120	64	4.0	911	1900	50.22	3	3
10. Owen NB LL QUEUE	*	120	90	4.0	53	1900	50.22	3	3
12. Owen NB T QUEUE	*	120	90	4.0	232	1900	50.22	3	3
14. Owen NB R QUEUE	*	120	90	4.0	334	1900	50.22	3	3
16. Longmeadow SB L QUEUE	*	120	90	4.0	205	1900	50.22	3	3
18. Longmeadow SB TR QUEUE	*	120	90	4.0	267	1900	50.22	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235178.36	850537.06	1.8	*
2. LR_2	*	235171.39	850540.94	1.8	*
3. LR_3	*	235169.19	850544.88	1.8	*
4. LR_4	*	235166.98	850548.81	1.8	*
5. LR_5	*	235163.70	850553.81	1.8	*
6. LR_6	*	235161.97	850558.50	1.8	*
7. LR_7	*	235160.23	850563.19	1.8	*
8. LR_8	*	235158.48	850567.88	1.8	*
9. LR_9	*	235156.75	850572.56	1.8	*
10. LR_10	*	235155.02	850577.25	1.8	*
11. LR_11	*	235153.27	850581.94	1.8	*
12. LR_12	*	235151.53	850586.62	1.8	*
13. LR_13	*	235149.80	850591.31	1.8	*
14. LR_14	*	235148.05	850596.00	1.8	*
15. LR_15	*	235146.31	850600.69	1.8	*
16. LR_16	*	235144.56	850605.38	1.8	*
17. LR_17	*	235142.83	850610.06	1.8	*
18. LR_18	*	235130.50	850610.00	1.8	*
19. LR_19	*	235132.23	850605.31	1.8	*
20. LR_20	*	235133.98	850600.62	1.8	*
21. LR_21	*	235135.72	850595.94	1.8	*
22. LR_22	*	235137.45	850591.25	1.8	*
23. LR_23	*	235139.20	850586.56	1.8	*
24. LR_24	*	235140.94	850581.88	1.8	*
25. LR_25	*	235142.69	850577.19	1.8	*

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JOB: First Light-Taunton-Dean, Longmeadow & Owen EX SAT RUN: CAL3QHC
RUN

RECEPTOR	COORDINATES (M) X	Y	Z
26. LR_26	235144.42	850572.50	1.8
27. LR_27	235146.16	850567.81	1.8
28. LR_28	235147.91	850563.12	1.8
29. LR_29	235149.64	850558.44	1.8
30. LR_30	235151.38	850553.75	1.8
31. LR_31	235153.12	850549.06	1.8
32. LR_32	235154.86	850544.38	1.8
33. LR_33	235154.91	850539.38	1.8
34. LR_34	235156.66	850534.69	1.8
35. LR_35	235153.22	850528.19	1.8
36. LR_36	235149.31	850523.50	1.8
37. LR_37	235144.55	850522.06	1.8
38. LR_38	235139.75	850520.56	1.8
39. LR_39	235134.97	850519.12	1.8
40. LR_40	235130.19	850517.69	1.8
41. LR_41	235125.41	850516.25	1.8
42. LR_42	235120.62	850514.75	1.8
43. LR_43	235115.83	850513.31	1.8
44. LR_44	235111.05	850511.88	1.8
45. LR_45	235106.27	850510.38	1.8
46. LR_46	235101.48	850508.94	1.8
47. LR_47	235096.70	850507.50	1.8
48. LR_48	235091.92	850506.00	1.8
49. LR_49	235087.12	850504.56	1.8
50. LR_50	235082.34	850503.12	1.8
51. LR_51	235077.56	850501.69	1.8
52. LR_52	235072.78	850500.19	1.8
53. LR_53	235068.00	850498.75	1.8
54. LR_54	235063.20	850497.31	1.8
55. LR_55	235073.41	850479.50	1.8
56. LR_56	235078.19	850480.94	1.8
57. LR_57	235082.97	850482.38	1.8
58. LR_58	235087.75	850483.81	1.8
59. LR_59	235092.55	850485.31	1.8

60. LR_60	*	235097.31	850486.75	1.8 *
61. LR_61	*	235102.09	850488.19	1.8 *
62. LR_62	*	235107.00	850489.25	1.8 *
63. LR_63	*	235111.78	850490.69	1.8 *
64. LR_64	*	235116.56	850492.12	1.8 *
65. LR_65	*	235121.34	850493.56	1.8 *
66. LR_66	*	235126.88	850494.75	1.8 *
67. LR_67	*	235131.12	850496.00	1.8 *
68. LR_68	*	235135.80	850497.12	1.8 *
69. LR_69	*	235140.27	850497.81	1.8 *
70. LR_70	*	235145.27	850497.75	1.8 *
71. LR_71	*	235149.83	850496.81	1.8 *
72. LR_72	*	235153.11	850496.06	1.8 *
73. LR_73	*	235156.19	850495.12	1.8 *
74. LR_75	*	235202.16	850511.88	1.8 *
75. LR_76	*	235204.62	850514.00	1.8 *
76. LR_77	*	235207.84	850516.75	1.8 *
77. LR_79	*	235212.31	850520.25	1.8 *
78. LR_80	*	235217.08	850521.75	1.8 *

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JOB: First Light-Taunton-Dean, Longmeadow & Owen EX SAT RUN: CAL3QHC
RUN

RECEPTOR	*	X	Y	Z *
	*	COORDINATES (M)		*
79. LR_81	*	235221.84	850523.25	1.8 *
80. LR_82	*	235226.45	850524.75	1.8 *
81. LR_83	*	235231.23	850526.25	1.8 *
82. LR_84	*	235236.00	850527.75	1.8 *
83. LR_85	*	235240.45	850530.38	1.8 *
84. LR_86	*	235245.23	850531.88	1.8 *
85. LR_87	*	235249.98	850533.38	1.8 *
86. LR_88	*	235254.45	850535.50	1.8 *
87. LR_89	*	235259.22	850537.00	1.8 *
88. LR_90	*	235263.38	850541.00	1.8 *
89. LR_91	*	235268.14	850542.50	1.8 *
90. LR_92	*	235272.91	850544.00	1.8 *
91. LR_93	*	235277.69	850545.50	1.8 *
92. LR_94	*	235275.39	850561.56	1.8 *

93. LR_95	*	235270.62	850560.06	1.8	*
94. LR_96	*	235265.86	850558.56	1.8	*
95. LR_97	*	235261.09	850557.00	1.8	*
96. LR_98	*	235256.31	850555.50	1.8	*
97. LR_99	*	235251.56	850554.00	1.8	*
98. LR_100	*	235246.80	850552.50	1.8	*
99. LR_101	*	235242.02	850551.00	1.8	*
**. LR_102	*	235237.27	850549.50	1.8	*
**. LR_103	*	235232.48	850548.00	1.8	*
**. LR_104	*	235227.72	850546.50	1.8	*
**. LR_105	*	235222.95	850545.00	1.8	*
**. LR_106	*	235218.19	850543.44	1.8	*
**. LR_107	*	235213.42	850541.94	1.8	*
**. LR_108	*	235208.66	850541.38	1.8	*
**. LR_109	*	235202.81	850539.88	1.8	*
**. LR_110	*	235198.05	850538.38	1.8	*
**. LR_111	*	235194.19	850537.31	1.8	*
**. LR_112	*	235189.44	850535.81	1.8	*
**. LR_113	*	235184.66	850534.31	1.8	*
**. LR_114	*	235159.12	850493.88	1.8	*
**. LR_115	*	235161.91	850492.31	1.8	*
**. LR_116	*	235165.55	850490.00	1.8	*
**. LR_117	*	235168.09	850487.94	1.8	*
**. LR_118	*	235170.88	850485.00	1.8	*
**. LR_119	*	235173.97	850481.00	1.8	*
**. LR_120	*	235176.31	850476.75	1.8	*
**. LR_121	*	235178.02	850473.00	1.8	*
**. LR_122	*	235181.77	850468.19	1.8	*
**. LR_123	*	235183.45	850463.50	1.8	*
**. LR_124	*	235185.16	850458.81	1.8	*
**. LR_125	*	235186.86	850454.12	1.8	*
**. LR_126	*	235188.56	850449.38	1.8	*
**. LR_127	*	235190.27	850444.69	1.8	*
**. LR_128	*	235191.95	850440.00	1.8	*
**. LR_129	*	235193.66	850435.31	1.8	*
**. LR_130	*	235195.36	850430.56	1.8	*
**. LR_131	*	235197.06	850425.88	1.8	*
**. LR_132	*	235211.48	850433.06	1.8	*
**. LR_133	*	235209.78	850437.75	1.8	*

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen EX SAT RUN: CAL3QHC
RUN

RECEPTOR	COORDINATES (M) X	Y	Z
**. LR_134	235208.08	850442.50	1.8
**. LR_135	235206.38	850447.19	1.8
**. LR_136	235204.69	850451.88	1.8
**. LR_137	235202.98	850456.56	1.8
**. LR_138	235201.28	850461.25	1.8
**. LR_139	235199.58	850466.00	1.8
**. LR_140	235197.88	850470.69	1.8
**. LR_141	235196.19	850475.38	1.8
**. LR_142	235194.48	850480.06	1.8
**. LR_143	235194.25	850485.06	1.8
**. LR_144	235194.02	850489.75	1.8
**. LR_145	235194.09	850494.19	1.8
**. LR_146	235194.45	850498.88	1.8
**. LR_147	235195.98	850503.62	1.8
**. LR_148	235199.00	850508.31	1.8

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.				

```
   0.     0.    0.1    0.1
 10.  *     0.     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 20.  *     0.     0.     0.     0.    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 30.  *     0.     0.     0.     0.    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 60.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 70.  *    0.4    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.2    0.2
 80.  *    0.9    0.5    0.4    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 90.  *    1.1    0.7    0.6    0.4    0.4    0.3    0.2    0.1     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
100.  *    1.1    0.9    0.7    0.6    0.4    0.4    0.4    0.3    0.3    0.2    0.1    0.1     0.     0.     0.     0.
0.    0.2    0.2    0.2
110.  *    1.1    0.9    0.7    0.5    0.6    0.5    0.4    0.4    0.4    0.4    0.3    0.3    0.2    0.1    0.1    0.1
0.    0.2    0.3    0.3
120.  *    0.9    0.5    0.5    0.5    0.6    0.6    0.5    0.5    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.2
0.2    0.4    0.6    0.5
130.  *    0.8    0.6    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.4
0.4    0.5    0.5    0.7
140.  *    0.8    0.5    0.6    0.6    0.5    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.3    0.3    0.3
0.3    0.4    0.4    0.4
150.  *    0.6    0.6    0.6    0.4    0.4    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2
0.1    0.4    0.4    0.5
160.  *    0.6    0.8    0.7    0.6    0.6    0.6    0.5    0.6    0.4    0.4    0.5    0.5    0.5    0.4    0.4    0.4
0.3    0.3    0.4    0.4
170.  *    0.8    0.9    0.7    0.5    0.4    0.5    0.6    0.6    0.6    0.7    0.6    0.7    0.6    0.6    0.6    0.6
0.6    0.2    0.3    0.3

------*-------------------------------------------------------------------------------------------------------------
--------------------
MAX   *    1.1    0.9    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.7    0.6    0.7    0.6    0.6    0.6    0.6
0.6    0.5    0.6    0.7
```

DEGR. * 90 100 100 100 110 120 170 160 170 170 170 170 170 170 170 170
170 130 120 130

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
180. *	0.8	0.6	0.3	0.4	0.6	0.6	0.7	0.8	0.9	0.9	0.8	0.8	0.6	0.6	0.5	0.5	0.5	0.1	0.1	0.1
190. *	0.5	0.5	0.5	0.6	0.7	0.8	1.1	1.1	1.1	1.	1.	0.7	0.5	0.5	0.4	0.4	0.4	0.1	0.1	0.1
200. *	0.5	0.4	0.4	0.8	0.9	1.	1.	1.1	1.1	1.	0.9	0.7	0.6	0.6	0.4	0.4	0.4	0.1	0.1	0.1
210. *	0.6	0.6	0.7	0.7	1.1	1.1	1.1	1.	0.9	0.8	0.7	0.6	0.5	0.4	0.4	0.4	0.3	0.	0.	0.
220. *	0.8	0.6	0.7	0.8	1.1	1.1	1.	1.	0.9	0.6	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.	0.	0.
230. *	0.7	0.6	0.7	0.9	0.9	0.9	0.9	0.8	0.5	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.	0.	0.
240. *	0.7	0.8	0.7	0.8	0.8	0.6	0.6	0.6	0.5	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.	0.	0.
250. *	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.6	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.	0.	0.
260. *	0.5	0.3	0.5	0.6	0.6	0.6	0.6	0.5	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.	0.	0.
270. *	0.4	0.4	0.5	0.5	0.6	0.6	0.5	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2				

```
0.2     0.     0.     0.
280.  *    0.3    0.6    0.6    0.6    0.7    0.7    0.6    0.4    0.2    0.2    0.2    0.2    0.3    0.2    0.2    0.2
0.1     0.     0.     0.
290.  *    0.3    0.6    0.7    0.8    0.7    0.7    0.5    0.4    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.2
0.1     0.     0.     0.
300.  *    0.3    0.7    0.8    0.8    0.8    0.7    0.5    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2
0.1     0.     0.     0.
310.  *    0.3    0.6    0.7    0.6    0.6    0.6    0.5    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.1
0.1     0.     0.     0.
320.  *    0.3    0.6    0.6    0.6    0.7    0.5    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.2    0.1
0.     0.     0.     0.
330.  *    0.1    0.5    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.1    0.1
0.     0.     0.     0.
340.  *    0.1    0.2    0.2    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1
0.     0.     0.    0.1
350.  *     0.    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1     0.
0.     0.     0.    0.1
360.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.
0.     0.    0.1    0.1

------*-----------------------------------------------------------------------------------------------------------------------
---------------------
MAX   *    1.1    0.9    0.8    0.9    1.1    1.1    1.1    1.1    1.1     1.     1.    0.8    0.6    0.6    0.6    0.6
0.6    0.5    0.6    0.7
DEGR. *     90    100    300    230    210    210    190    190    190    190    190    180    170    170    170    170
170    130    120    130

      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
```

```
 REC37  REC38  REC39  REC40

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.7    0.8    1.1    1.3    1.3    1.1    1.2    0.5    0.4
    0.1     0.     0.     0.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.7    0.8    1.1    1.3    1.3    1.1    1.2    0.5    0.4
 0.1     0.     0.     0.
 DEGR. *      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
 0      0      0      0
```



```
       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
 REC37  REC38  REC39  REC40

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
  10.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.5    0.7    0.9    1.1    1.2    1.2    1.1    1.1    0.6    0.5
  0.3    0.1     0.     0.
  20.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.5    0.7     1.    1.1    1.1    1.1     1.     1.    0.6    0.5
  0.3    0.3    0.1    0.1
  30.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.6    0.7    0.9     1.    1.1    1.1     1.     1.    0.6    0.3
  0.4    0.3    0.3    0.3
  40.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.6    0.7    0.9     1.     1.     1.    0.8    0.9    0.5    0.4
  0.4    0.3    0.3    0.3
```

```
  50.  *    0.2    0.2    0.2    0.2    0.2    0.3    0.6    0.7    1.     1.     1.     1.     0.8    0.8    0.3    0.4
  0.3    0.3    0.3    0.3
  60.  *    0.2    0.2    0.2    0.2    0.2    0.3    0.6    0.7    1.     1.     1.     1.     0.8    0.8    0.2    0.4
  0.5    0.5    0.2    0.2
  70.  *    0.2    0.2    0.2    0.2    0.2    0.3    0.6    0.8    1.     1.     1.     1.     0.9    1.     0.5    0.7
  0.7    0.7    0.8    0.8
  80.  *    0.2    0.2    0.2    0.2    0.2    0.3    0.6    0.9    1.     1.     1.2    1.3    1.2    1.2    1.     0.9
  0.9    0.7    0.8    0.8
  90.  *    0.2    0.2    0.2    0.2    0.2    0.4    0.7    1.1    1.3    1.4    1.4    1.4    1.4    1.5    1.1    0.8
  0.8    0.9    0.9    0.9
 100.  *    0.2    0.2    0.3    0.3    0.4    0.7    1.1    1.4    1.4    1.4    1.4    1.5    1.4    1.2    0.8    0.7
0.5    0.6    0.5    0.5
 110.  *    0.3    0.5    0.5    0.6    0.7    0.9    1.2    1.4    1.4    1.4    1.4    1.4    1.2    1.     0.5    0.4
0.4    0.6    0.8    0.8
 120.  *    0.6    0.6    0.6    0.6    0.8    1.1    1.3    1.5    1.5    1.5    1.5    1.6    1.1    0.8    0.4    0.5
0.5    0.7    0.8    0.6
 130.  *    0.7    0.7    0.6    0.7    0.9    1.2    1.4    1.5    1.4    1.4    1.4    1.4    0.8    0.7    0.5    0.5
0.7    0.9    0.7    0.9
 140.  *    0.4    0.5    0.5    0.6    0.6     1.    1.1    1.2    1.4    1.4    1.3    1.3    0.9    0.6    0.6    0.7
0.8    0.7    0.7    0.7
 150.  *    0.5    0.5    0.7    0.7    0.9    1.1    1.2    1.4    1.3    1.4    1.4    1.4    0.8    0.6    0.5    0.6
0.7    0.6    0.7    0.7
 160.  *    0.4    0.4    0.5    0.5    0.6    0.8    0.8    0.9    1.1     1.     1.     1.2    0.6    0.4    0.5    0.7
0.6    0.7    0.7    0.7
 170.  *    0.3    0.3    0.3    0.4    0.5    0.5    0.5    0.6    0.6    0.6    0.8    0.8    0.5    0.3    0.6    0.6
0.6    0.7    0.7    0.7
 180.  *    0.2    0.2    0.2    0.2    0.4    0.4    0.4    0.5    0.5    0.5    0.6    0.6    0.3    0.5    0.6    0.6
0.7    0.7    0.7    0.7
 190.  *    0.1    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.6    0.6    0.6    0.4    0.4    0.6    0.7
0.7    0.7    0.7    0.7
 200.  *    0.1    0.2    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.5    0.4    0.4    0.6    0.7
0.7    0.7    0.7    0.7
 210.  *     0.    0.1    0.1    0.2    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.6    0.7    0.8
0.7    0.7    0.8    0.8
 220.  *     0.     0.     0.     0.     0.    0.2    0.2    0.3    0.3    0.3    0.4    0.4    0.5    0.6    0.8    0.9
0.9    0.9    0.9    0.9
 230.  *     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.3    0.3    0.3    0.5    0.5    0.8    0.9
0.9    0.9    0.9    0.9
 240.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.2    0.3    0.4    0.7    0.8
0.7    0.7    0.7    0.7
```

```
 250.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.5    0.6
 0.6    0.6    0.6    0.6
 260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.4
 0.4    0.3    0.3    0.3
 270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2
 0.2    0.2    0.2    0.2
 280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.     0.     0.     0.     0.
 0.     0.     0.     0.
 320.  *     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.3    0.1    0.1    0.     0.1    0.
 0.     0.     0.     0.
 330.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.3    0.4    0.6    0.2    0.2    0.     0.     0.
 0.     0.     0.     0.
 340.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.5    0.7    0.8     1.    1.1    0.8    0.8    0.1    0.     0.
 0.     0.     0.     0.
 350.  *    0.1    0.2    0.2    0.2    0.2    0.3    0.4    0.7    0.8    1.1    1.3    1.3     1.    1.1    0.4    0.1    0.
 0.     0.     0.     0.
 360.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.3    0.7    0.8    1.1    1.3    1.3    1.1    1.2    0.5    0.4    0.1
  0.     0.     0.     0.

 ------*-----------------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *    0.7    0.7    0.7    0.7    0.9    1.2    1.4    1.5    1.5    1.5    1.5    1.6    1.4    1.5    1.1    0.9    0.9
 0.9    0.9    0.9    0.9
 DEGR. *    130    130    150    130    130    130    130    120    120    120    120    120     90     90     90     80     80
 90     90     90     90
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.3	0.5	0.9	0.9	0.9	0.9
10.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.5	0.9	1.1	0.9	0.9	1.
20.	* 0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.6	1.	1.2	1.2	1.2	1.2
30.	* 0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.7	1.1	1.3	1.3	1.3	1.3
40.	* 0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.	1.3	1.5	1.5	1.5	1.4
50.	* 0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.2	1.5	1.6	1.6	1.6	1.6
60.	* 0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	1.4	1.6	1.7	1.7	1.9	1.9
70.	* 0.8	0.8	0.7	0.7	0.7	0.8	0.8	0.7	0.5	0.5	0.6	0.6	0.6	0.5	1.5	1.7	1.8	1.8	1.9	2.1
80.	* 0.8	0.9	0.9	0.9	0.9	1.	1.	1.	0.8	0.9	0.9	0.9	0.9	0.9	0.9	1.	1.	1.	1.2	1.2
90.	* 0.7	0.7	0.9	0.9	0.9	0.9	0.7	0.8	0.8	0.9	0.9	0.9	0.9	1.	0.4	0.4	0.5	0.5	0.6	0.6
100.	* 0.6	0.7	0.7	0.8	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.2	0.2	0.2	0.2	0.2	0.2
110.	* 0.7	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.1	0.1	0.1	0.2	0.2	0.2
120.	* 0.7	0.8	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.6	0.1	0.1	0.1	0.1	0.2	0.2
130.	* 0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.	0.	0.	0.	0.	0.1
140.	* 0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.5	0.	0.	0.	0.	0.	0.

150.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.5	0.3	0.	0.	
0.	0.	0.	0.															
160.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.4	0.2	0.	0.	
0.	0.	0.	0.															
170.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.5	0.3	0.2	0.	0.	
0.	0.	0.	0.															
180.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.4	0.3	0.	0.	0.	
0.	0.	0.	0.															
190.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.5	0.3	0.3	0.	0.	0.	
0.	0.	0.	0.															
200.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.5	0.3	0.3	0.2	0.	0.	0.	
0.	0.	0.	0.1															
210.	*	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.6	0.3	0.3	0.3	0.1	0.	0.	0.1	
0.1	0.1	0.2	0.2															
220.	*	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.5	0.5	0.4	0.4	0.2	0.1	0.	0.	0.1	
0.1	0.1	0.2	0.2															
230.	*	0.9	0.9	0.9	0.8	0.6	0.5	0.5	0.5	0.4	0.4	0.2	0.2	0.1	0.	0.1	0.1	
0.1	0.2	0.2	0.2															
240.	*	0.7	0.7	0.6	0.6	0.6	0.6	0.4	0.3	0.3	0.3	0.2	0.2	0.1	0.	0.1	0.1	
0.2	0.3	0.4	0.4															
250.	*	0.6	0.6	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.	0.1	0.2	
0.2	0.5	0.6	0.7															
260.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.	0.1	0.2	
0.4	0.6	0.8	1.1															
270.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.	0.	0.2	0.2	
0.4	0.7	1.1	1.2															
280.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.2	0.2	
0.5	0.8	1.3	1.4															
290.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.2	0.3	
0.6	1.	1.2	1.2															
300.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.2	0.3	
0.7	1.	1.2	1.2															
310.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.3	
0.8	1.	1.1	1.2															
320.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.3	
0.8	0.9	0.9	0.9															
330.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.3	0.3	
0.9	0.9	0.9	0.9															
340.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.3	0.3	
0.9	1.	1.	1.															

```
 350.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3    0.4
 0.9     1.     1.     1.
 360.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.3    0.5
 0.9    0.9    0.9    0.9

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.9    0.9    0.9    0.9    0.9     1.     1.     1.    0.9    0.9    0.9    0.9    0.9     1.    1.5    1.7
 1.8    1.8    1.9    2.1
 DEGR. *    230     80     80     80     80     80     80     80    100     80     80     80     80     90     70     70
 70     70     60     70
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
 REC77  REC78  REC79  REC80

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9     1.     1.    0.8    0.7    0.8     1.
   1.1    1.1     1.     1.
  10.  *     1.    0.9     1.     1.     1.    0.9     1.     1.     1.    1.1    1.1     1.    0.5    0.8    0.9     1.
  1.1     1.     1.     1.
  20.  *    1.2    1.1    1.1    1.1    1.1    1.2    1.2    1.3    1.3    1.3    0.9    0.5    0.3    0.9    0.9     1.
  1.1     1.     1.    0.9
  30.  *    1.3    1.3    1.3    1.3    1.4    1.3    1.3    1.3    1.1    1.2    0.8    0.5    0.3     1.    1.1    1.1
  1.1    1.1     1.    0.9
  40.  *    1.4    1.4    1.4    1.3    1.3    1.3    1.3    1.4    1.4    1.2    0.7    0.5    0.6     1.     1.    1.1
  1.1    1.1     1.     1.
```

```
 50. *    1.6    1.5    1.5    1.5    1.5    1.6    1.7    1.6    1.7    1.2    0.9    0.6    0.6     1.     1.    1.2
 1.2    1.1    1.1     1.
 60. *     2.     2.     2.    2.1    2.1    1.9    1.9    1.8    1.5    1.1    0.7    0.6    0.6    0.8    0.9     1.
 1.     1.     1.     1.
 70. *     2.    1.9    1.9    1.9    1.9    1.7    1.7    1.5    1.3     1.    0.7    0.5    0.5    0.4    0.5    0.7
 1.    0.8    0.7    0.7
 80. *    1.2    1.1    1.2    1.3    1.4    1.1    1.1     1.    0.8    0.6    0.3    0.2    0.2    0.1    0.2    0.3
 0.6    0.5    0.5    0.5
 90. *    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.2    0.1    0.1    0.1     0.    0.1    0.2
 0.3    0.2    0.2    0.2
100. *    0.4    0.2    0.2    0.2    0.3    0.2    0.3    0.3    0.2    0.3    0.2    0.2    0.3     0.     0.    0.1
0.2    0.1    0.1    0.1
110. *    0.2    0.2    0.2    0.2    0.3    0.3    0.4    0.4    0.3    0.3    0.3    0.3    0.3     0.     0.    0.1
0.1    0.1    0.1    0.1
120. *    0.2    0.2    0.2    0.2    0.2    0.2    0.4    0.4    0.3    0.2    0.2    0.2    0.2     0.     0.    0.1
0.1    0.1    0.1    0.1
130. *    0.1     0.    0.1    0.1    0.1     0.    0.1    0.1    0.2    0.2    0.2    0.2    0.2     0.     0.     0.
0.1    0.1    0.1     0.
140. *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.2     0.     0.     0.
0.     0.     0.     0.
150. *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1     0.     0.     0.
0.     0.     0.     0.
160. *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.1     0.     0.     0.
170. *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1     0.     0.
0.     0.     0.     0.
180. *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1
0.2     0.     0.     0.
190. *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.4    0.2    0.1
0.2    0.2    0.2    0.1
200. *    0.1     0.    0.1    0.1    0.1     0.    0.1     0.     0.     0.     0.     0.     0.     0.    0.3    0.3    0.3
0.3    0.2    0.2    0.2
210. *    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.    0.4    0.4    0.4
0.3    0.2    0.2    0.2
220. *    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.    0.4    0.4    0.4
0.4    0.3    0.3    0.2
230. *    0.2    0.2    0.2    0.3    0.4    0.2    0.3    0.2    0.2    0.1     0.     0.     0.     0.    0.2    0.2    0.3
0.4    0.4    0.3    0.3
240. *    0.5    0.4    0.6    0.6    0.7    0.6    0.6    0.6    0.4    0.3    0.2     0.     0.     0.    0.3    0.4    0.6
0.7    0.8    0.7    0.6
```

```
 250.  *    0.9    0.9     1.     1.    1.1     1.    1.1    1.1     1.    0.6    0.4    0.3    0.2    0.7    0.7    0.9
 0.9     1.    0.8    0.8
 260.  *    1.2    1.2    1.3    1.4    1.6    1.6    1.6    1.6    1.5    1.1    0.9    0.6    0.5    0.8    0.8     1.
 1.     1.     1.    1.1
 270.  *    1.4    1.5    1.5    1.6    1.6    1.7    1.7    1.7    1.7    1.3    1.1    0.9    0.9    0.7    0.8    0.9
 1.     1.    1.2    1.2
 280.  *    1.4    1.4    1.5    1.5    1.5    1.5    1.5    1.5    1.5    1.3    1.1     1.    0.9    0.7    0.8    0.9
 1.    0.9    1.1    1.1
 290.  *    1.3    1.3    1.4    1.4    1.4    1.4    1.4    1.4    1.5    1.3     1.    0.9    0.9    0.5    0.5    0.8
 0.9    1.1    1.1    1.2
 300.  *    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.2    1.2    1.1     1.    0.9    0.8    0.6    0.9    0.9
 1.1    1.1    1.1    1.2
 310.  *    1.2    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.9    0.8    0.7    0.9    0.8     1.
 1.1    1.1    1.1    1.1
 320.  *     1.    0.9    0.9     1.     1.    0.9    0.9    0.9    0.9     1.    0.8    0.8    0.7    0.8    0.9    0.9
 1.1    1.1    1.1    1.1
 330.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.8    0.7    0.8    0.8    0.9
 1.    1.1    1.1    1.1
 340.  *     1.     1.     1.     1.     1.     1.     1.     1.    0.9     1.    0.8    0.7    0.8    0.8    0.8    0.9
 1.    1.1    1.1     1.
 350.  *     1.     1.     1.     1.     1.     1.     1.     1.    0.9     1.    0.8    0.9    0.7    0.8    0.8     1.
 1.    1.1    1.1     1.
 360.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9     1.     1.    0.8    0.7    0.8     1.
 1.1    1.1     1.     1.

 ------*-----------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *     2.     2.     2.    2.1    2.1    1.9    1.9    1.8    1.7    1.3    1.1     1.    0.9     1.    1.1    1.2
 1.2    1.1    1.2    1.2
 DEGR. *     60     60     60     60     60     60     60     60     50     20     10      0    270     30     30     50
 50      0    270    270
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
*	REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88	REC89	REC90	REC91	REC92	REC93	REC94	REC95	REC96
REC97	REC98	REC99	REC100													
.	*	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.6	0.3	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.													
10.	*	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.5	0.2	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.													
20.	*	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.5	0.3	0.	0.	0.	0.1	0.1
0.1	0.1	0.1	0.1	0.1													
30.	*	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.4	0.3	0.	0.	0.1	0.1	0.1
0.1	0.1	0.1	0.1	0.1													
40.	*	1.	1.	1.	0.9	0.9	0.8	0.8	0.8	0.7	0.4	0.3	0.	0.	0.1	0.1	0.1
0.1	0.1	0.1	0.1	0.1													
50.	*	0.9	0.9	1.	1.	0.9	0.9	0.8	0.8	0.5	0.4	0.3	0.	0.	0.1	0.1	0.1
0.1	0.2	0.2	0.2	0.2													
60.	*	0.9	0.9	0.9	0.8	0.8	0.7	0.6	0.7	0.5	0.3	0.3	0.	0.	0.2	0.2	0.2
0.2	0.3	0.3	0.3	0.3													
70.	*	0.6	0.6	0.7	0.7	0.5	0.6	0.5	0.6	0.4	0.2	0.2	0.1	0.2	0.3	0.3	0.4
0.4	0.4	0.5	0.5	0.5													
80.	*	0.4	0.4	0.5	0.4	0.4	0.4	0.3	0.4	0.3	0.1	0.1	0.2	0.3	0.4	0.5	0.5
0.5	0.6	0.7	0.7	0.7													
90.	*	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.3	0.2	0.	0.	0.2	0.3	0.4	0.6	0.6
0.8	0.8	0.8	0.8	0.9													
100.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.	0.	0.3	0.4	0.5	0.6	0.7
0.9	0.9	0.9	0.9	0.9													
110.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.2	0.3	0.5	0.6	0.7
0.7	0.8	0.9	0.9	0.9													
120.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.2	0.4	0.5	0.6	0.7
0.8	0.8	0.8	0.8	0.8													
130.	*	0.	0.	0.1	0.	0.	0.	0.	0.1	0.1	0.	0.	0.2	0.4	0.5	0.7	0.7
0.8	0.8	0.8	0.8	0.8													
140.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.	0.	0.2	0.4	0.5	0.6	0.7
0.7	0.7	0.7	0.7	0.7													

150. * 0. 0. 0. 0. 0. 0. 0. 0.1 0.1 0. 0. 0.2 0.4 0.6 0.7 0.7
0.7 0.7 0.7 0.7
160. * 0. 0. 0. 0. 0. 0. 0. 0.1 0.1 0.1 0. 0.3 0.5 0.6 0.7 0.7
0.7 0.7 0.7 0.7
170. * 0. 0. 0. 0. 0. 0. 0. 0.1 0.1 0. 0. 0.3 0.6 0.7 0.7 0.7
0.7 0.7 0.7 0.7
180. * 0. 0. 0. 0. 0. 0. 0. 0.1 0.1 0.1 0. 0.4 0.6 0.7 0.7 0.7
0.7 0.7 0.7 0.7
190. * 0. 0. 0.1 0.1 0. 0.1 0. 0.1 0.1 0.1 0. 0.6 0.8 0.8 0.7 0.7
0.7 0.7 0.7 0.7
200. * 0.2 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0. 0.6 0.8 0.8 0.8 0.8
0.8 0.8 0.8 0.9
210. * 0.2 0.2 0.2 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.8 0.8 0.8 0.8 0.8
0.8 0.8 0.8 0.9
220. * 0.2 0.2 0.2 0.2 0.2 0.1 0.1 0.2 0.2 0.2 0.1 0.9 1.1 1.1 1.1 1.
1. 1.1 1.1 1.3
230. * 0.3 0.2 0.2 0.2 0.2 0.2 0.2 0.4 0.4 0.3 0.3 1.1 1.1 1.2 1.1 1.1
1.1 1.2 1.3 1.3
240. * 0.5 0.4 0.5 0.4 0.4 0.4 0.4 0.6 0.6 0.7 0.6 1.3 1.2 1.2 1.2 1.2
1.2 1.3 1.4 1.8
250. * 0.8 0.8 0.9 1. 0.8 0.9 0.9 1.1 1.1 1.2 1.1 1.1 1. 1.1 1.1 1.1
1.1 1.1 1.4 1.5
260. * 1.1 1.2 1.3 1.3 1.1 1.2 1.2 1.5 1.5 1.4 1.3 0.7 0.6 0.6 0.6 0.7
0.7 0.7 0.8 0.7
270. * 1.1 1.1 1.2 1.1 1.2 1.2 1.2 1.3 1.3 1.3 1.2 0.2 0.2 0.2 0.3 0.4
0.4 0.4 0.4 0.4
280. * 1.1 1.2 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.1 0.1 0.1 0.1 0.1 0.1
0.1 0.1 0.1 0.1
290. * 1.3 1.3 1.2 1.2 1.1 1.1 1. 1. 1. 1. 0.8 0.1 0.1 0.1 0.1 0.1
0.1 0.1 0.1 0.1
300. * 1.2 1.1 1.1 1. 0.9 0.9 0.8 0.9 0.9 0.9 0.7 0. 0.1 0.1 0.1 0.1
0.1 0.1 0.1 0.1
310. * 1.1 1.1 1. 0.9 0.9 0.8 0.8 0.8 0.8 0.9 0.7 0. 0. 0.1 0. 0.
0.1 0.1 0.1 0.1
320. * 1. 1. 1. 0.9 0.8 0.8 0.8 0.7 0.8 0.8 0.5 0. 0. 0. 0. 0.
0. 0. 0. 0.
330. * 1. 1. 0.9 0.8 0.8 0.8 0.8 0.7 0.7 0.7 0.4 0. 0. 0. 0. 0.
0. 0. 0. 0.
340. * 1. 1. 0.9 0.8 0.8 0.8 0.8 0.7 0.7 0.7 0.3 0. 0. 0. 0. 0.
0. 0. 0. 0.

```
 350.  *     1.    0.9    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.7    0.3     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 360.  *    0.9    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.6    0.3     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.5    1.5    1.4    1.3    1.3    1.2    1.2    1.2    1.2
 1.2    1.3    1.4    1.8
 DEGR. *    290    290    260    260    280    280    280    260    260    260    260    240    240    230    240    240
 240    240    240    240
```



```
       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC101 REC102 REC103 REC104 REC105 REC106 REC107 REC108 REC109 REC110 REC111 REC112 REC113 REC114 REC115 REC116
 REC117 REC118 REC119 REC120

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.     0.6    0.4    0.3    0.3    0.3
    0.3    0.4    0.4    0.5
  10.  *     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.3    0.2    0.3    0.4    0.2
  0.4    0.5    0.5    0.9
  20.  *    0.1    0.1    0.1    0.2    0.2    0.1     0.     0.    0.1     0.    0.1    0.3    0.3    0.5    0.3    0.8
  0.8    0.8    0.7    0.9
  30.  *    0.1    0.1    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.4    0.4    0.5    0.7    0.8
  0.8    0.8    0.9     1.
  40.  *    0.1    0.1    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.5    0.6    0.8    0.7    0.8
  0.8    0.8    0.8    0.8
```

```
 50.  *    0.2    0.2    0.3    0.3    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.7    0.8    0.8    0.7    0.8
 0.8    0.7    0.7    0.7
 60.  *    0.3    0.4    0.5    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.9    0.8    0.5    0.7    0.4
 0.6    0.6    0.7    0.5
 70.  *    0.5    0.6    0.9     1.    1.2     1.     1.     1.     1.    1.1    1.2    0.3    0.3    0.4    0.4    0.5
 0.4    0.5    0.5    0.4
 80.  *    0.7     1.    1.2    1.4    1.6    1.4    1.4    1.6    1.6    1.6    1.6    0.2    0.1    0.2    0.3    0.3
 0.5    0.5    0.5    0.4
 90.  *    0.9    1.1    1.3    1.6    1.7    1.7    1.7    1.8    1.8    1.9    1.9    0.1    0.3    0.3    0.3    0.4
 0.5    0.5    0.4    0.4
100.  *     1.    1.2    1.5    1.7    1.7    1.7    1.7    1.8    1.8    1.8    1.8    0.3    0.3    0.3    0.3    0.4
0.5    0.4    0.4    0.4
110.  *    0.9    1.2    1.4    1.6    1.6    1.5    1.6    1.6    1.6    1.7    1.5    0.3    0.3    0.3    0.4    0.5
0.5    0.4    0.4    0.4
120.  *    0.8    1.1    1.3    1.4    1.4    1.5    1.4    1.4    1.4    1.4    1.4    0.3    0.3    0.4    0.4    0.4
0.4    0.4    0.4    0.6
130.  *    0.8    1.2    1.3    1.2    1.4    1.4    1.3    1.3    1.3    1.3    1.2    0.2    0.2    0.3    0.3    0.4
0.4    0.5    0.5    0.5
140.  *    0.7    1.1    1.2    1.2    1.3    1.2    1.2    1.2    1.3    1.3    1.1    0.2    0.2    0.3    0.3    0.3
0.4    0.4    0.4    0.4
150.  *    0.7    1.2    1.2    1.3    1.2    1.2    1.2    1.2    1.2    1.2    1.1    0.1    0.1    0.1    0.1    0.2
0.3    0.4    0.3    0.3
160.  *    0.7    1.2    1.2    1.3    1.3    1.2    1.2    1.2    1.2    1.4    1.2     0.     0.    0.1    0.1    0.1
0.2    0.2    0.2    0.3
170.  *    0.8    1.2    1.2    1.3    1.2    1.2    1.2    1.3    1.3    1.5     1.     0.     0.     0.     0.     0.
0.1    0.1    0.1    0.2
180.  *    0.9    1.2    1.3    1.3    1.3    1.3    1.3    1.4    1.5    1.4     1.     0.     0.     0.     0.     0.
0.     0.     0.    0.1
190.  *     1.    1.2    1.3    1.4    1.4    1.3    1.6    1.6    1.4    1.2    0.6     0.     0.     0.     0.     0.
0.     0.     0.    0.1
200.  *    1.3    1.5    1.6    1.6    1.6    1.6    1.5    1.4    1.2    1.1    0.7     0.     0.     0.     0.     0.
0.     0.     0.     0.
210.  *    1.3    1.5    1.5    1.5    1.5    1.5    1.5    1.4    1.2     1.    0.6     0.     0.     0.     0.     0.
0.     0.     0.     0.
220.  *    1.6    1.8    1.7    1.6    1.5    1.6    1.3    1.2    1.2    0.9    0.7     0.     0.     0.     0.     0.
0.     0.     0.     0.
230.  *    1.8    1.9    1.8    1.8    1.8    1.6    1.4    1.4    1.2    1.1    0.9     0.     0.     0.     0.     0.
0.     0.     0.     0.
240.  *     2.     2.     2.    1.9    1.8    1.8    1.6    1.4    1.2     1.    0.8     0.     0.     0.     0.     0.
0.     0.     0.     0.
```

```
 250.  *    1.6    1.6    1.7    1.7    1.7    1.3    1.1    1.1     1.     1.    0.8    0.2    0.1     0.     0.     0.
 0.     0.     0.     0.
 260.  *     1.     1.    1.1    1.2    1.1    0.9    0.8    0.7    0.7    0.6    0.5    0.3    0.3    0.2    0.2    0.1
 0.     0.     0.     0.
 270.  *    0.5    0.6    0.6    0.6    0.5    0.4    0.4    0.5    0.5    0.4    0.3    0.7    0.6    0.5    0.3    0.3
 0.2    0.2    0.1     0.
 280.  *    0.3    0.3    0.3    0.3    0.5    0.4    0.4    0.3    0.4    0.4    0.5    0.8    0.7    0.6    0.6    0.5
 0.4    0.3    0.2    0.2
 290.  *    0.1    0.2    0.2    0.2    0.2    0.1    0.4    0.4    0.4    0.3    0.4    0.7    0.7    0.7    0.6    0.5
 0.4    0.4    0.4    0.4
 300.  *    0.1    0.2    0.2    0.2    0.2    0.1    0.2    0.3    0.4    0.3    0.3    0.7    0.7    0.6    0.5    0.5
 0.4    0.4    0.4    0.4
 310.  *    0.1    0.1    0.1    0.1    0.2     0.     0.    0.1    0.1    0.2    0.3    0.7    0.6    0.5    0.5    0.4
 0.4    0.4    0.4    0.5
 320.  *     0.     0.     0.    0.1    0.1     0.     0.     0.    0.1    0.1    0.1    0.7    0.5    0.4    0.4    0.4
 0.3    0.3    0.3    0.4
 330.  *     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.    0.1    0.6    0.4    0.4    0.4    0.3
 0.2    0.3    0.2    0.3
 340.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.5    0.5    0.4    0.3    0.2
 0.3    0.2    0.2    0.4
 350.  *     0.     0.    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.6    0.4    0.4    0.4    0.4
 0.3    0.3    0.3    0.5
 360.  *     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.    0.6    0.4    0.3    0.3    0.3
 0.3    0.4    0.4    0.5

 ------*-----------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *     2.     2.     2.    1.9    1.8    1.8    1.7    1.8    1.8    1.9    1.9    0.9    0.8    0.8    0.7    0.8
 0.8    0.8    0.9     1.
 DEGR. *    240    240    240    240    230    240     90     90     90     90     90     60     50     40     30     20
 20     20     30     30
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC121	REC122	REC123	REC124	REC125	REC126	REC127	REC128	REC129	REC130	REC131	REC132	REC133	REC134	REC135	REC136	REC137	REC138	REC139	REC140
.	*	0.5	0.6	0.6	0.6	0.6	0.8	0.8	0.9	0.7	0.4	0.4	0.4	0.4	0.6	0.7	0.7	0.8	0.8	0.9	1.
10.	*	1.	0.9	1.1	1.	1.1	0.9	0.9	0.9	0.9	0.2	0.3	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7
20.	*	1.1	1.	1.1	1.	1.	0.9	0.8	0.8	0.8	0.2	0.2	0.2	0.3	0.3	0.3	0.6	0.6	0.6	0.6	0.6
30.	*	0.9	0.9	0.8	0.8	0.7	0.8	0.8	0.8	0.7	0.	0.1	0.2	0.2	0.2	0.2	0.3	0.5	0.5	0.6	0.7
40.	*	0.8	0.6	0.7	0.7	0.7	0.6	0.5	0.4	0.3	0.	0.	0.	0.	0.1	0.2	0.2	0.2	0.2	0.4	0.5
50.	*	0.6	0.5	0.4	0.4	0.5	0.5	0.5	0.4	0.3	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.3
60.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
70.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
80.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90.	*	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
100.	*	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2
110.	*	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2
120.	*	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.2	0.2
130.	*	0.5	0.4	0.4	0.4	0.2	0.2	0.2	0.1	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.2	0.2	0.3	0.3
140.	*	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.	0.	0.	0.	0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.4

150. * 0.3 0.3 0.3 0.3 0.2 0.2 0.2 0.1 0. 0. 0. 0.1 0.3 0.4 0.4 0.5
0.6 0.8 0.8 0.9
160. * 0.3 0.3 0.2 0.2 0.2 0.2 0.1 0.1 0. 0. 0. 0.3 0.4 0.5 0.6 0.8
0.9 1. 1. 1.1
170. * 0.2 0.2 0.2 0.1 0.1 0.1 0.1 0.1 0. 0. 0.1 0.4 0.6 0.7 0.9 1.
1.1 1.2 1.2 1.3
180. * 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0. 0. 0. 0.1 0.4 0.6 0.8 0.9 1.1
1.1 1.1 1.2 1.3
190. * 0.1 0.1 0.1 0. 0. 0. 0. 0. 0. 0. 0.1 0.5 0.8 0.8 0.9 0.9
0.9 0.9 0.9 1.
200. * 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.1 0.7 0.8 0.8 0.8 0.8
0.8 0.8 0.8 1.
210. * 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.1 0.7 0.7 0.7 0.8 0.8
0.8 0.7 0.7 0.9
220. * 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.2 0.7 0.7 0.7 0.7 0.7
0.7 0.7 0.7 1.
230. * 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.2 0.6 0.7 0.7 0.7 0.7
0.7 0.7 0.7 0.9
240. * 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.2 0.4 0.6 0.7 0.7 0.7 0.7
0.7 0.7 0.6 0.9
250. * 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.2 0.4 0.7 0.7 0.7 0.7 0.7
0.7 0.6 0.6 0.9
260. * 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.2 0.5 0.7 0.7 0.7 0.7 0.7
0.7 0.6 0.7 0.9
270. * 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.2 0.6 0.6 0.7 0.7 0.7 0.7
0.7 0.8 0.8 1.1
280. * 0.2 0.1 0.1 0. 0. 0. 0. 0. 0. 0.2 0.6 0.7 0.7 0.8 0.8 0.9
0.9 0.9 1.2 1.3
290. * 0.2 0.2 0.2 0.2 0.1 0.1 0.1 0. 0. 0.3 0.8 0.8 0.9 0.9 0.9 0.9
1.1 1.1 1.3 1.5
300. * 0.4 0.4 0.2 0.2 0.2 0.2 0.2 0.1 0.1 0.5 0.9 1. 1. 1. 1. 1.1
1.1 1.2 1.4 1.4
310. * 0.5 0.4 0.4 0.3 0.3 0.3 0.2 0.2 0.2 0.6 0.9 0.9 0.9 0.9 1. 1.
1.1 1.2 1.4 1.5
320. * 0.4 0.3 0.3 0.3 0.3 0.2 0.2 0.2 0.2 0.7 1.1 1.1 1.1 1.2 1.2 1.3
1.2 1.4 1.4 1.4
330. * 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.8 1.1 1.1 1.2 1.2 1.2 1.3
1.3 1.4 1.4 1.4
340. * 0.4 0.4 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.7 0.9 0.9 1. 1. 1. 1.3
1.3 1.4 1.3 1.3

```
 350.  *    0.5    0.5    0.5    0.4    0.5    0.5    0.5    0.5    0.5    0.4    0.7    0.7    0.8    0.9    0.9     1.
 1.     1.    1.3    1.2
 360.  *    0.5    0.6    0.6    0.6    0.6    0.8    0.8    0.9    0.7    0.4    0.4    0.4    0.4    0.6    0.7    0.7
 0.8    0.8    0.9     1.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.1     1.    1.1     1.    1.1    0.9    0.9    0.9    0.9    0.8    1.1    1.1    1.2    1.2    1.2    1.3
 1.3    1.4    1.4    1.5
 DEGR. *     20     20     10     10     10     10     10      0     10    330    320    320    330    320    320    320
 330    320    300    290
```

FF PAGE 13

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC141	REC142	REC143	REC144	REC145	REC146
.	*	0.7	0.6	0.6	0.7	0.9	0.8
10.	*	0.7	0.5	0.5	0.8	0.8	0.8
20.	*	0.5	0.6	0.6	0.7	0.8	0.8
30.	*	0.5	0.5	0.5	0.6	0.8	0.9
40.	*	0.4	0.5	0.5	0.7	0.7	0.8
50.	*	0.2	0.4	0.4	0.5	0.7	0.9
60.	*	0.2	0.2	0.2	0.3	0.4	0.6
70.	*	0.	0.	0.	0.2	0.2	0.3
80.	*	0.	0.	0.	0.	0.	0.1
90.	*	0.	0.	0.	0.	0.	0.
100.	*	0.	0.	0.	0.	0.	0.
110.	*	0.	0.	0.	0.	0.	0.
120.	*	0.	0.	0.	0.	0.	0.

130.	*	0.1	0.	0.	0.	0.	0.
140.	*	0.2	0.1	0.	0.	0.	0.
150.	*	0.5	0.2	0.2	0.	0.	0.
160.	*	0.8	0.6	0.3	0.2	0.1	0.
170.	*	1.2	1.	0.8	0.4	0.3	0.1
180.	*	1.2	1.	0.9	0.7	0.6	0.4
190.	*	1.2	1.1	1.	0.8	0.7	0.5
200.	*	1.	0.9	0.8	0.9	0.8	0.5
210.	*	1.	1.	0.8	0.8	0.6	0.4
220.	*	1.	0.9	0.8	0.7	0.5	0.4
230.	*	1.	0.8	0.8	0.6	0.4	0.3
240.	*	1.	0.8	0.8	0.5	0.4	0.3
250.	*	1.	0.8	0.7	0.5	0.5	0.5
260.	*	1.1	1.	0.9	0.7	0.7	0.8
270.	*	1.3	1.1	0.8	0.9	0.8	0.9
280.	*	1.4	1.2	0.9	1.	0.7	0.6
290.	*	1.4	1.2	0.9	0.8	0.7	0.5
300.	*	1.4	1.1	0.8	0.5	0.4	0.4
310.	*	1.2	0.9	0.6	0.5	0.5	0.6
320.	*	1.2	1.	0.6	0.4	0.7	0.7
330.	*	1.2	1.	0.5	0.4	0.4	0.7
340.	*	0.9	0.4	0.2	0.4	0.5	0.8
350.	*	0.7	0.6	0.5	0.6	0.7	0.7
360.	*	0.7	0.6	0.6	0.7	0.9	0.8
MAX	*	1.4	1.2	1.	1.	0.9	0.9
DEGR.	*	280	280	190	280	0	30

THE HIGHEST CONCENTRATION OF 2.10 ppm OCCURRED AT RECEPTOR REC64.

FF

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*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/6/2012 2:11:57 PM
** File: F:\2975 FirstLight\Microscale\Worst\34 Dean Longmeadow & Owen LOS&ADT\2022NBAM.ou2
**
*********************************************
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 NB AM RUN: CAL3QHC RUN

DATE : 12/ 6/12
TIME : 14:11:56

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE	VPH	EF	H	W	V/C	QUEUE
	*	X1	Y1	X2	Y2	*	(M)								
	*	(DEG)	(G/MI)	(M)	(M)		(VEH)								
1. Dean EB LL	*	235106.84	850497.38	235156.62	850512.50	*	52.	73.	AG	7.	8.5	0.0	9.0		
2. Dean EB LL QUEUE	*	235156.62	850512.50	235155.20	850512.06	*	1.	253.	AG	116.	100.0	0.0	3.0	0.47	0.2
3. Dean EB TR	*	235066.06	850482.19	235155.91	850506.75	*	93.	75.	AG						

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 1033.   8.5   0.0   13.4
 4. Dean EB TR QUEUE                  *  235155.91    850506.75   234930.83    850445.19 *     233.   255. AG
 172. 100.0   0.0    7.4 1.09  38.9
 5. Dean WB LL                        *  235225.55    850536.69   235185.14    850524.44 *      42.   253. AG
 173.   8.5   0.0    9.4
 6. Dean WB LL QUEUE                  *  235185.14    850524.44   235276.48    850552.12 *      95.    73. AG
 107. 100.0   0.0    3.4 1.09  15.9
 7. Dean WB TR                        *  235275.70    850557.25   235185.14    850530.19 *      95.   253. AG
 634.   8.5   0.0   13.4
 8. Dean WB TR QUEUE                  *  235185.14    850530.19   235218.55    850540.19 *      35.    73. AG
 135. 100.0   0.0    7.4 0.42   5.8
 9. Owen NB LL                        *  235207.16    850428.06   235179.00    850508.50 *      85.   341. AG
 140.   8.5   0.0    9.7
10. Owen NB LL QUEUE                  *  235179.00    850508.50   235185.94    850488.69 *      21.   161. AG
92. 100.0   0.0    3.7 0.37   3.5
11. Owen NB T                         *  235208.59    850429.88   235181.17    850508.88 *      84.   341. AG
353.   8.5   0.0    9.7
12. Owen NB T QUEUE                   *  235181.17    850508.88   235203.56    850444.38 *      68.   161. AG
92. 100.0   0.0    3.7 0.93  11.4
13. Owen NB R                         *  235207.52    850436.38   235189.47    850493.75 *      60.   343. AG
321.   8.5   0.0    9.7
14. Owen NB R QUEUE                   *  235189.47    850493.75   235205.81    850441.75 *      54.   163. AG
92. 100.0   0.0    3.7 0.85   9.1
15. Longmeadow SB L                   *  235147.36    850577.25   235162.05    850535.25 *      44.   161. AG
109.   8.5   0.0    9.0
16. Longmeadow SB L QUEUE             *  235162.05    850535.25   235156.73    850550.69 *      16.   341. AG
92. 100.0   0.0    3.0 0.29   2.7
17. Longmeadow SB TR                  *  235134.16    850612.38   235159.88    850533.06 *      83.   162. AG
349.   8.5   0.0    9.0
18. Longmeadow SB TR QUEUE            *  235159.88    850533.06   235139.39    850596.00 *      66.   342. AG
92. 100.0   0.0    3.0 0.92  11.0
19. Dean EB OUTBOUND                  *  235195.64    850518.06   235273.02    850547.94 *      83.    69. AG
1209.   8.5   0.0   13.4
20. Dean WB OUTBOUND                  *  235156.41    850522.00   235064.98    850493.25 *      96.   253. AG
689.   8.5   0.0   13.4
21. Longmeadow NB OUTBOUND            *  235170.09    850535.00   235137.33    850611.62 *      83.   337. AG
459.   8.5   0.0    9.0
22. Owen SB OUTBOUND                  *  235175.48    850492.88   235201.41    850426.62 *      71.   159. AG
762.   8.5   0.0    9.7
23. EBL                               *  235157.16    850512.56   235169.77    850534.62 *      25.    30.
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AG      7.   9.4   0.0    9.0
24. EBT                              *  235156.48    850506.94   235194.47    850517.81 *      40.     74. AG
779.   8.5   0.0   12.0
25. EBR                              *  235146.28    850504.06   235174.59    850494.12 *      30.    109. AG
254.  10.3   0.0    9.0
26. WBL                              *  235183.81    850524.38   235172.95    850497.75 *      29.    202. AG
173.   9.4   0.0    9.0
27. WBT                              *  235184.27    850530.12   235156.48    850522.06 *      29.    254. AG
535.   8.5   0.0   12.0
28. WBR                              *  235184.27    850529.44   235168.45    850535.38 *      17.    291. AG
99.  10.3   0.0    9.0
29. NBL                              *  235178.67    850509.50   235156.05    850521.88 *      26.    299. AG
140.   9.4   0.0    9.0
30. NBT                              *  235180.75    850510.00   235170.09    850534.50 *      27.    336. AG
353.   8.5   0.0    9.0
31. NBR                              *  235188.33    850495.06   235198.97    850518.94 *      26.     24. AG
321.  10.3   0.0    9.0
32. SBL                              *  235162.09    850534.69   235188.55    850516.94 *      32.    124. AG
109.   9.4   0.0    9.0
33. SBT                              *  235159.89    850532.50   235173.73    850497.75 *      37.    158. AG
335.   8.5   0.0    9.0
34. SBR                              *  235160.44    850532.31   235155.61    850521.56 *      12.    204. AG
14.  10.3   0.0    9.0
```


JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 NB AM RUN: CAL3QHC
RUN

DATE : 12/ 6/12
TIME : 14:11:56

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Dean EB LL QUEUE	120	113	4.0	7	1900	45.89	3	3

4. Dean EB TR QUEUE	*	120	84	4.0	1033	1900	45.89	3	3
6. Dean WB LL QUEUE	*	120	104	4.0	173	1900	45.89	3	3
8. Dean WB TR QUEUE	*	120	66	4.0	634	1900	45.89	3	3
10. Owen NB LL QUEUE	*	120	90	4.0	140	1900	45.89	3	3
12. Owen NB T QUEUE	*	120	90	4.0	353	1900	45.89	3	3
14. Owen NB R QUEUE	*	120	90	4.0	321	1900	45.89	3	3
16. Longmeadow SB L QUEUE	*	120	90	4.0	109	1900	45.89	3	3
18. Longmeadow SB TR QUEUE	*	120	90	4.0	349	1900	45.89	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235178.36	850537.06	1.8	*
2. LR_2	*	235171.39	850540.94	1.8	*
3. LR_3	*	235169.19	850544.88	1.8	*
4. LR_4	*	235166.98	850548.81	1.8	*
5. LR_5	*	235163.70	850553.81	1.8	*
6. LR_6	*	235161.97	850558.50	1.8	*
7. LR_7	*	235160.23	850563.19	1.8	*
8. LR_8	*	235158.48	850567.88	1.8	*
9. LR_9	*	235156.75	850572.56	1.8	*
10. LR_10	*	235155.02	850577.25	1.8	*
11. LR_11	*	235153.27	850581.94	1.8	*
12. LR_12	*	235151.53	850586.62	1.8	*
13. LR_13	*	235149.80	850591.31	1.8	*
14. LR_14	*	235148.05	850596.00	1.8	*
15. LR_15	*	235146.31	850600.69	1.8	*
16. LR_16	*	235144.56	850605.38	1.8	*
17. LR_17	*	235142.83	850610.06	1.8	*
18. LR_18	*	235130.50	850610.00	1.8	*
19. LR_19	*	235132.23	850605.31	1.8	*
20. LR_20	*	235133.98	850600.62	1.8	*
21. LR_21	*	235135.72	850595.94	1.8	*
22. LR_22	*	235137.45	850591.25	1.8	*
23. LR_23	*	235139.20	850586.56	1.8	*
24. LR_24	*	235140.94	850581.88	1.8	*
25. LR_25	*	235142.69	850577.19	1.8	*

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 NB AM RUN: CAL3QHC RUN

RECEPTOR	COORDINATES (M) X	Y	Z
26. LR_26	235144.42	850572.50	1.8
27. LR_27	235146.16	850567.81	1.8
28. LR_28	235147.91	850563.12	1.8
29. LR_29	235149.64	850558.44	1.8
30. LR_30	235151.38	850553.75	1.8
31. LR_31	235153.12	850549.06	1.8
32. LR_32	235154.86	850544.38	1.8
33. LR_33	235154.91	850539.38	1.8
34. LR_34	235156.66	850534.69	1.8
35. LR_35	235153.22	850528.19	1.8
36. LR_36	235149.31	850523.50	1.8
37. LR_37	235144.55	850522.06	1.8
38. LR_38	235139.75	850520.56	1.8
39. LR_39	235134.97	850519.12	1.8
40. LR_40	235130.19	850517.69	1.8
41. LR_41	235125.41	850516.25	1.8
42. LR_42	235120.62	850514.75	1.8
43. LR_43	235115.83	850513.31	1.8
44. LR_44	235111.05	850511.88	1.8
45. LR_45	235106.27	850510.38	1.8
46. LR_46	235101.48	850508.94	1.8
47. LR_47	235096.70	850507.50	1.8
48. LR_48	235091.92	850506.00	1.8
49. LR_49	235087.12	850504.56	1.8
50. LR_50	235082.34	850503.12	1.8
51. LR_51	235077.56	850501.69	1.8
52. LR_52	235072.78	850500.19	1.8
53. LR_53	235068.00	850498.75	1.8
54. LR_54	235063.20	850497.31	1.8
55. LR_55	235073.41	850479.50	1.8
56. LR_56	235078.19	850480.94	1.8
57. LR_57	235082.97	850482.38	1.8
58. LR_58	235087.75	850483.81	1.8
59. LR_59	235092.55	850485.31	1.8

60. LR_60	*	235097.31	850486.75	1.8 *
61. LR_61	*	235102.09	850488.19	1.8 *
62. LR_62	*	235107.00	850489.25	1.8 *
63. LR_63	*	235111.78	850490.69	1.8 *
64. LR_64	*	235116.56	850492.12	1.8 *
65. LR_65	*	235121.34	850493.56	1.8 *
66. LR_66	*	235126.88	850494.75	1.8 *
67. LR_67	*	235131.12	850496.00	1.8 *
68. LR_68	*	235135.80	850497.12	1.8 *
69. LR_69	*	235140.27	850497.81	1.8 *
70. LR_70	*	235145.27	850497.75	1.8 *
71. LR_71	*	235149.83	850496.81	1.8 *
72. LR_72	*	235153.11	850496.06	1.8 *
73. LR_73	*	235156.19	850495.12	1.8 *
74. LR_75	*	235202.16	850511.88	1.8 *
75. LR_76	*	235204.62	850514.00	1.8 *
76. LR_77	*	235207.84	850516.75	1.8 *
77. LR_79	*	235212.31	850520.25	1.8 *
78. LR_80	*	235217.08	850521.75	1.8 *

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 NB AM RUN: CAL3QHC RUN

RECEPTOR	*	X	Y	Z *
	*	COORDINATES (M)		*
79. LR_81	*	235221.84	850523.25	1.8 *
80. LR_82	*	235226.45	850524.75	1.8 *
81. LR_83	*	235231.23	850526.25	1.8 *
82. LR_84	*	235236.00	850527.75	1.8 *
83. LR_85	*	235240.45	850530.38	1.8 *
84. LR_86	*	235245.23	850531.88	1.8 *
85. LR_87	*	235249.98	850533.38	1.8 *
86. LR_88	*	235254.45	850535.50	1.8 *
87. LR_89	*	235259.22	850537.00	1.8 *
88. LR_90	*	235263.38	850541.00	1.8 *
89. LR_91	*	235268.14	850542.50	1.8 *
90. LR_92	*	235272.91	850544.00	1.8 *
91. LR_93	*	235277.69	850545.50	1.8 *
92. LR_94	*	235275.39	850561.56	1.8 *

93.	LR_95	*	235270.62	850560.06	1.8 *
94.	LR_96	*	235265.86	850558.56	1.8 *
95.	LR_97	*	235261.09	850557.00	1.8 *
96.	LR_98	*	235256.31	850555.50	1.8 *
97.	LR_99	*	235251.56	850554.00	1.8 *
98.	LR_100	*	235246.80	850552.50	1.8 *
99.	LR_101	*	235242.02	850551.00	1.8 *
**.	LR_102	*	235237.27	850549.50	1.8 *
**.	LR_103	*	235232.48	850548.00	1.8 *
**.	LR_104	*	235227.72	850546.50	1.8 *
**.	LR_105	*	235222.95	850545.00	1.8 *
**.	LR_106	*	235218.19	850543.44	1.8 *
**.	LR_107	*	235213.42	850541.94	1.8 *
**.	LR_108	*	235208.66	850541.38	1.8 *
**.	LR_109	*	235202.81	850539.88	1.8 *
**.	LR_110	*	235198.05	850538.38	1.8 *
**.	LR_111	*	235194.19	850537.31	1.8 *
**.	LR_112	*	235189.44	850535.81	1.8 *
**.	LR_113	*	235184.66	850534.31	1.8 *
**.	LR_114	*	235159.12	850493.88	1.8 *
**.	LR_115	*	235161.91	850492.31	1.8 *
**.	LR_116	*	235165.55	850490.00	1.8 *
**.	LR_117	*	235168.09	850487.94	1.8 *
**.	LR_118	*	235170.88	850485.00	1.8 *
**.	LR_119	*	235173.97	850481.00	1.8 *
**.	LR_120	*	235176.31	850476.75	1.8 *
**.	LR_121	*	235178.02	850473.00	1.8 *
**.	LR_122	*	235181.77	850468.19	1.8 *
**.	LR_123	*	235183.45	850463.50	1.8 *
**.	LR_124	*	235185.16	850458.81	1.8 *
**.	LR_125	*	235186.86	850454.12	1.8 *
**.	LR_126	*	235188.56	850449.38	1.8 *
**.	LR_127	*	235190.27	850444.69	1.8 *
**.	LR_128	*	235191.95	850440.00	1.8 *
**.	LR_129	*	235193.66	850435.31	1.8 *
**.	LR_130	*	235195.36	850430.56	1.8 *
**.	LR_131	*	235197.06	850425.88	1.8 *
**.	LR_132	*	235211.48	850433.06	1.8 *
**.	LR_133	*	235209.78	850437.75	1.8 *

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 NB AM RUN: CAL3QHC
RUN

RECEPTOR	COORDINATES (M) X	Y	Z
**. LR_134	235208.08	850442.50	1.8
**. LR_135	235206.38	850447.19	1.8
**. LR_136	235204.69	850451.88	1.8
**. LR_137	235202.98	850456.56	1.8
**. LR_138	235201.28	850461.25	1.8
**. LR_139	235199.58	850466.00	1.8
**. LR_140	235197.88	850470.69	1.8
**. LR_141	235196.19	850475.38	1.8
**. LR_142	235194.48	850480.06	1.8
**. LR_143	235194.25	850485.06	1.8
**. LR_144	235194.02	850489.75	1.8
**. LR_145	235194.09	850494.19	1.8
**. LR_146	235194.45	850498.88	1.8
**. LR_147	235195.98	850503.62	1.8
**. LR_148	235199.00	850508.31	1.8

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.				

```
   0.     0.    0.1    0.1
 10.  *     0.     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 20.  *     0.     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 30.  *     0.     0.     0.     0.    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 60.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.2    0.2
 70.  *    0.3     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.2    0.2
 80.  *    0.6    0.4    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 90.  *    0.9    0.5    0.4    0.4    0.3     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
100.  *     1.    0.7    0.5    0.4    0.4    0.3    0.3    0.3     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.2    0.2    0.2
110.  *     1.    0.6    0.5    0.5    0.5    0.5    0.4    0.4    0.3    0.2    0.2     0.     0.     0.     0.     0.
0.    0.2    0.2    0.2
120.  *    0.8    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.2    0.2    0.2    0.1    0.1     0.
0.    0.2    0.3    0.4
130.  *    0.6    0.5    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.4    0.3    0.2    0.2    0.1
0.1    0.5    0.6    0.7
140.  *    0.6    0.4    0.5    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3
0.2    0.5    0.6    0.7
150.  *    0.4    0.5    0.5    0.4    0.5    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2
0.1    0.5    0.5    0.6
160.  *    0.5    0.9    0.7    0.8    0.7    0.5    0.4    0.4    0.3    0.4    0.4    0.3    0.3    0.3    0.3    0.4
0.4    0.5    0.5    0.6
170.  *    0.8    0.8    0.6    0.7    0.6    0.7    0.6    0.4    0.4    0.6    0.5    0.5    0.5    0.6    0.6    0.5
0.5    0.3    0.3    0.3

------*-------------------------------------------------------------------------------------------------------------
--------------------
MAX   *     1.    0.9    0.7    0.8    0.7    0.7    0.6    0.5    0.5    0.6    0.5    0.5    0.5    0.6    0.6    0.5
0.5    0.5    0.6    0.7
```

DEGR. * 100 160 160 160 160 170 170 120 130 170 170 170 170 170 170 170
170 130 130 130

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
180.	*	0.6	0.5	0.5	0.5	0.5	0.4	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.1	0.2	0.2
190.	*	0.3	0.5	0.5	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.1	0.2	0.2
200.	*	0.3	0.7	0.5	0.5	0.8	0.9	0.8	0.7	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.5	0.1	0.1	0.1
210.	*	0.6	0.6	0.6	0.8	1.	0.9	0.8	0.7	0.7	0.7	0.7	0.6	0.7	0.6	0.6	0.5	0.4	0.1	0.1	0.1
220.	*	0.7	0.6	0.7	0.9	1.	0.9	0.8	0.8	0.7	0.6	0.5	0.5	0.5	0.5	0.4	0.3	0.3	0.1	0.1	0.1
230.	*	0.7	0.6	0.8	0.9	0.9	0.8	0.8	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.3	0.3	0.1	0.1	0.1
240.	*	0.7	0.8	0.8	0.9	0.7	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.3	0.2	0.2	0.	0.	0.
250.	*	0.5	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.2	0.2	0.2	0.	0.	0.
260.	*	0.4	0.5	0.5	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.	0.	0.
270.	*	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.2				

```
0.2     0.     0.     0.
280.  *    0.3    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.2
0.2     0.     0.     0.
290.  *    0.4    0.5    0.5    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.4    0.3    0.3    0.2
0.1     0.     0.     0.
300.  *    0.4    0.5    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.3    0.3    0.2
0.1     0.     0.     0.
310.  *    0.3    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.3    0.3    0.3    0.1
0.1     0.     0.     0.
320.  *    0.3    0.5    0.5    0.6    0.6    0.6    0.6    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.1
0.     0.     0.     0.
330.  *    0.2    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.3    0.3    0.2    0.2    0.1    0.1
0.     0.     0.     0.
340.  *    0.1    0.2    0.2    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1
0.     0.    0.1    0.1
350.  *     0.    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1     0.
0.     0.    0.1    0.1
360.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.
0.     0.    0.1    0.1

------*-------------------------------------------------------------------------------------------------------------------------
---------------------
MAX   *     1.    0.9    0.8    0.9     1.    0.9    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.7    0.7    0.7
0.6    0.5    0.6    0.7
DEGR. *    100    160    230    220    210    200    190    190    200    200    200    190    190    190    190    190
180    130    130    130

      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
```

```
 REC37  REC38  REC39  REC40

 ------*-------------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.2    0.2    0.5    0.6    0.7    0.7    0.8    0.8    0.9    0.9    0.9    1.2    0.9     1.    0.5    0.3
    0.2    0.1     0.     0.

 ------*-------------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.2    0.2    0.5    0.6    0.7    0.7    0.8    0.8    0.9    0.9    0.9    1.2    0.9     1.    0.5    0.3
 0.2    0.1     0.     0.
 DEGR. *      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
 0      0      0      0
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
 REC37  REC38  REC39  REC40

 ------*-------------------------------------------------------------------------------------------------------------------------
 ---------------------
  10.  *    0.2    0.3    0.6    0.6    0.7    0.7    0.7    0.8    0.8    0.8    0.8    0.9    0.8    0.9    0.5    0.5
  0.3    0.1    0.1    0.1
  20.  *    0.2    0.4    0.5    0.5    0.6    0.6    0.6    0.6    0.6    0.7    0.7    0.9    0.8    0.8    0.5    0.5
  0.3    0.2    0.1    0.1
  30.  *    0.2    0.4    0.5    0.5    0.5    0.6    0.6    0.6    0.6    0.6    0.6    0.8    0.7    0.8    0.5    0.4
  0.5    0.2    0.2    0.2
  40.  *    0.2    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.8    0.7    0.7    0.4    0.4
  0.3    0.3    0.2    0.2
```

```
  50.  *    0.2    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.8    0.7    0.7    0.3    0.3
  0.3    0.3    0.3    0.2
  60.  *    0.2    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.8    0.7    0.7    0.1    0.3
  0.2    0.2    0.2    0.2
  70.  *    0.2    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.9    0.7    0.9    0.6    0.7
  0.7    0.7    0.7    0.7
  80.  *    0.3    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.7    0.9    1.1     1.    0.6    0.8
  0.7    0.7    0.7    0.8
  90.  *    0.3    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.8    1.1    1.2    1.1     1.    0.7    0.9
  0.8    0.7    0.8    0.6
 100.  *    0.4    0.5    0.5    0.5    0.5    0.5    0.7    0.8    0.9    0.9    1.3    1.3    1.1    0.8    0.7    0.6
 0.5    0.4    0.4    0.5
 110.  *    0.4    0.5    0.6    0.7    0.7    0.8    0.9     1.     1.    1.1    1.3    1.3    1.1    0.9    0.5    0.5
 0.4    0.4    0.6    0.6
 120.  *    0.7    0.7    0.7    0.9    0.9     1.     1.     1.     1.    1.1    1.2    1.4     1.    0.7    0.3    0.7
 0.5    0.6    0.7    0.6
 130.  *    0.9    0.9     1.     1.     1.     1.    0.9    0.9    1.1     1.    1.1    1.1    0.8    0.6    0.5    0.7
 0.7    0.8    0.8    0.9
 140.  *    0.8    0.7    0.7    0.7    0.7    0.8    0.9    0.9    0.9    1.2    1.2    1.1    0.7    0.7    0.8    0.6
 0.8    0.7    0.8    0.8
 150.  *    0.7    0.7    0.7    0.7    0.7     1.     1.    1.1     1.    1.2    1.3    1.3    0.9    0.7    0.7    0.7
 0.6    0.8    0.7    0.7
 160.  *    0.6    0.6    0.6    0.5    0.5    0.6    0.6    0.7     1.     1.    1.1    1.2    0.7    0.5    0.3    0.7
 0.6    0.7    0.7    0.7
 170.  *    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.4    0.4    0.5    0.7    0.5    0.3    0.5    0.5
 0.7    0.7    0.7    0.7
 180.  *    0.2    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.5    0.6    0.4    0.6    0.5    0.7
 0.7    0.7    0.7    0.7
 190.  *    0.2    0.2    0.2    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.4    0.4    0.5    0.7
 0.7    0.7    0.7    0.7
 200.  *    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.5    0.4    0.4    0.7    0.7
 0.7    0.7    0.7    0.7
 210.  *    0.1    0.1    0.1    0.2    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.7    0.7
 0.7    0.7    0.7    0.7
 220.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.7    0.8    0.8
 0.8    0.8    0.8    0.8
 230.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.4    0.4    0.4    0.4    0.6    0.8    0.9
 0.9    0.9    0.9    0.9
 240.  *     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.4    0.4    0.6    0.7     1.
 1.     1.     1.    0.9
```

```
 250.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.2    0.3    0.6    0.8
 0.8    0.8    0.8    0.8
 260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.4
 0.4    0.4    0.4    0.4
 270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2
 0.2    0.2    0.2    0.2
 280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.     0.     0.     0.
 0.1    0.1    0.1     0.
 310.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.2    0.     0.     0.     0.
 0.     0.     0.     0.
 320.  *     0.     0.    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.3    0.1    0.1     0.    0.1
 0.     0.     0.     0.
 330.  *    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.3    0.4    0.4    0.5    0.6    0.2    0.3     0.     0.
 0.     0.     0.     0.
 340.  *    0.1    0.1    0.2    0.3    0.4    0.4    0.6    0.6    0.7    0.7    0.8    0.9    0.5    0.6    0.2     0.
 0.     0.     0.     0.
 350.  *    0.1    0.2    0.4    0.5    0.6    0.6    0.7    0.8    0.8    0.9    0.9    1.1    0.7    0.9    0.4    0.2
 0.1     0.     0.     0.
 360.  *    0.2    0.2    0.5    0.6    0.7    0.7    0.8    0.8    0.9    0.9    0.9    1.2    0.9     1.    0.5    0.3
 0.2    0.1     0.     0.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.9    0.9     1.     1.     1.     1.     1.    1.1    1.1    1.2    1.3    1.4    1.1     1.    0.8     1.
 1.     1.     1.    0.9
 DEGR. *    130    130    130    130    130    120    120    150    130    140    100    120     80      0    140    240
 240    240    240    130
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.	1.	1.	1.
10.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.	1.	1.	1.
20.	*	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.	1.1	1.1	1.1
30.	*	0.2	0.2	0.2	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.1	1.1	1.1	1.1	1.1	1.1
40.	*	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.4	1.4	1.4	1.3	1.3	1.3
50.	*	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.6	1.5	1.5	1.5	1.5	1.6
60.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.6	1.6	1.6	1.6	1.7	1.7
70.	*	0.7	0.7	0.6	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	1.5	1.5	1.6	1.6	1.8	1.7
80.	*	0.8	0.7	0.6	0.6	0.6	0.7	0.8	0.8	0.8	0.7	0.8	0.7	0.7	0.7	0.9	0.9	1.	1.	1.	1.
90.	*	0.6	0.8	0.7	0.7	0.8	0.6	0.6	0.6	0.8	0.8	0.8	0.8	0.9	0.8	0.5	0.5	0.5	0.6	0.6	0.6
100.	*	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.2	0.2	0.2	0.3	0.3	0.3
110.	*	0.7	0.7	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.8	0.1	0.1	0.1	0.1	0.2	0.2
120.	*	0.8	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.1	0.1	0.1	0.1	0.1	0.2
130.	*	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.	0.	0.1	0.1	0.1	0.1
140.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.	0.	0.	0.	0.	0.

```
150.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6     0.     0.
0.     0.     0.     0.
160.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.5     0.     0.
0.     0.     0.     0.
170.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.4     0.     0.
0.     0.     0.     0.
180.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.3     0.     0.
0.     0.     0.     0.
190.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.6    0.3     0.     0.
0.     0.     0.     0.
200.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.4    0.3     0.     0.
0.1    0.1    0.1    0.1
210.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.6    0.4    0.3     0.     0.1
0.1    0.1    0.1    0.2
220.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.8    0.7    0.6    0.5    0.4    0.      0.     0.1
0.1    0.2    0.2    0.2
230.  *    0.9    0.9    0.9    0.9    0.9    0.8    0.8    0.8    0.8    0.7    0.6    0.6    0.5    0.4    0.2     0.2
0.2    0.2    0.2    0.3
240.  *    0.9    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.6    0.6    0.6    0.5    0.4    0.4     0.5
0.5    0.5    0.6    0.7
250.  *    0.8    0.7    0.7    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.4    0.3    0.8     0.9
1.     1.    1.1    1.2
260.  *    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.1    1.2     1.2
1.3    1.5    1.5    1.6
270.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.     1.3     1.4
1.4    1.5    1.5    1.6
280.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.     1.1     1.2
1.2    1.3    1.5    1.5
290.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     1.      1.1
1.1    1.3    1.3    1.3
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.      1.     1.
1.1    1.1    1.1    1.1
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.      0.9    1.
1.     1.    1.1    1.1
320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.      0.8    1.
1.     1.     1.     1.
330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.      1.     1.
1.     1.     1.     1.
340.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.      1.     1.
1.     1.     1.     1.
```

```
 350.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.     1.
 1.     1.     1.     1.
 360.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.     1.
 1.     1.     1.     1.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.9    0.9    0.9    0.9    0.9    1.6    1.6
 1.6    1.6    1.8    1.7
 DEGR. *    220    120    220    220    220    220    220    220     80    110    100    100     90    100     50     60
 60     60     70     60
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
 REC77  REC78  REC79  REC80

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *     1.     1.     1.     1.     1.     1.     1.     1.    1.1     1.     1.    0.8    0.6    0.7    0.7    0.7
   0.8    0.7    0.7    0.6
  10.  *     1.     1.     1.     1.     1.     1.    1.1    1.1    1.1     1.    0.9    0.8    0.5    0.7    0.7    0.9
  0.8    0.7    0.6    0.7
  20.  *    1.1    1.1    1.1    1.1    1.2    1.2    1.2    1.2    1.1    1.2    0.8    0.6    0.4    0.8    0.9    0.8
  0.8    0.7    0.7    0.7
  30.  *    1.1    1.1    1.2    1.2    1.2    1.2    1.2    1.2    1.1    1.1    0.8    0.5    0.5    0.8    0.8    0.8
  0.8    0.7    0.7    0.7
  40.  *    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.1    0.8    0.6    0.6    0.8    0.8    0.8
  0.8    0.8    0.8    0.8
```

```
 50.  *    1.6    1.5    1.4    1.4    1.4    1.4    1.4    1.4    1.3    1.2    0.9    0.7    0.8    0.8    0.8    0.9
 0.9    0.9    0.9    0.9
 60.  *    1.7    1.6    1.7    1.9    1.9    1.8    1.8    1.7    1.5    1.2    0.8    0.7    0.6    0.6    0.7    0.8
 0.9    0.9    0.9    0.8
 70.  *    1.7    1.7    1.7    1.7    1.7    1.6    1.5    1.6    1.4    0.9    0.5    0.6    0.6    0.4    0.5    0.6
 0.7    0.7    0.6    0.6
 80.  *    1.1    1.1    1.1    1.2    1.2    1.1     1.     1.    0.8    0.7    0.5    0.4    0.4    0.1    0.2    0.3
 0.4    0.4    0.4    0.3
 90.  *    0.6    0.6    0.6    0.6    0.6    0.4    0.5    0.6    0.6    0.4    0.3    0.3    0.3     0.    0.1    0.1
 0.2    0.2    0.2    0.2
100.  *    0.3    0.3    0.3    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.4    0.5    0.5     0.     0.    0.1
0.1    0.1    0.1    0.1
110.  *    0.2    0.2    0.3    0.3    0.4    0.5    0.5    0.5    0.4    0.3    0.3    0.4    0.4     0.     0.    0.1
0.1    0.1    0.1    0.1
120.  *    0.2    0.1    0.2    0.2    0.3    0.3    0.3    0.4    0.4    0.3    0.3    0.3    0.3     0.     0.     0.
0.1    0.1    0.1    0.1
130.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.1    0.3    0.3    0.3    0.3     0.     0.     0.
0.1    0.1     0.     0.
140.  *     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.1    0.1     0.     0.     0.
0.     0.     0.     0.
150.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1     0.     0.     0.
0.     0.     0.     0.
160.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
170.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1     0.     0.
0.     0.     0.     0.
180.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.3    0.2    0.1
0.     0.     0.     0.
190.  *     0.     0.     0.     0.    0.1     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.3    0.3
0.3    0.2     0.     0.
200.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.    0.4    0.4    0.3
0.4    0.4    0.3    0.2
210.  *    0.2    0.1    0.2    0.2    0.2    0.2    0.2    0.1    0.1     0.     0.     0.     0.    0.5    0.4    0.3
0.4    0.4    0.4    0.4
220.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1     0.     0.     0.    0.4    0.4    0.4
0.3    0.4    0.4    0.3
230.  *    0.4    0.3    0.3    0.4    0.4    0.3    0.3    0.3    0.2    0.1     0.     0.     0.    0.3    0.3    0.4
0.5    0.3    0.3    0.3
240.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.4    0.2    0.1    0.1    0.4    0.4    0.7
0.8    0.8    0.5    0.5
```

```
 250.  *    1.3    1.2    1.2    1.3    1.4    1.3    1.3    1.3    1.1    0.8    0.5    0.4    0.3    0.7    0.8    0.9
 0.9    0.8    0.8    0.8
 260.  *    1.7    1.6    1.7    1.7    1.7    1.8    1.8    1.8    1.6    1.4     1.    0.8    0.6     1.    0.9     1.
 0.9    0.9     1.    1.1
 270.  *    1.8    1.7    1.8    1.8    1.8    1.8    1.8    1.8    1.7    1.5    1.2    1.1    0.9    0.7    0.8     1.
 0.9    0.8     1.    0.9
 280.  *    1.5    1.5    1.5    1.6    1.6    1.6    1.6    1.6    1.5    1.3    1.1    1.1    0.9    0.6    0.8    0.7
 0.8    0.8    0.9     1.
 290.  *    1.3    1.3    1.3    1.3    1.4    1.3    1.3    1.3    1.3    1.2     1.    0.9    0.9    0.5    0.5    0.7
 0.8    0.9    0.9    0.9
 300.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.9    0.9    0.9    0.5    0.8    0.7
 0.9     1.     1.    0.9
 310.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.     1.    0.9    0.9    0.8    0.7    0.8    0.9
 0.9    0.8    0.8    0.8
 320.  *     1.     1.     1.     1.     1.     1.     1.     1.     1.    0.9    0.9    0.8    0.8    0.9    0.9    0.8
 0.8    0.8    0.8    0.8
 330.  *     1.     1.     1.     1.     1.     1.     1.     1.     1.    0.9     1.    0.8    0.8    0.8    0.7    0.7
 0.8    0.8    0.8    0.7
 340.  *     1.     1.     1.     1.     1.     1.     1.     1.     1.    0.9    0.9    0.8    0.7    0.8    0.7    0.8
 0.8    0.8    0.8    0.7
 350.  *     1.     1.     1.     1.     1.     1.     1.     1.     1.    0.9     1.    0.9    0.8    0.7    0.7    0.7
 0.8    0.8    0.7    0.6
 360.  *     1.     1.     1.     1.     1.     1.     1.     1.    1.1     1.     1.    0.8    0.6    0.7    0.7    0.7
 0.8    0.7    0.7    0.6

 ------*-------------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *    1.8    1.7    1.8    1.9    1.9    1.8    1.8    1.8    1.7    1.5    1.2    1.1    0.9     1.    0.9     1.
 0.9     1.     1.    1.1
 DEGR. *    270     70    270     60     60     60     60    260    270    270    270    270    270    260     20    260
 50     300    260    260
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88	REC89	REC90	REC91	REC92	REC93	REC94	REC95	REC96	REC97	REC98	REC99	REC100
.	*	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.
10.	*	0.7	0.7	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1
40.	*	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.6	0.1	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
50.	*	0.8	0.8	0.8	0.8	0.8	0.7	0.5	0.6	0.3	0.1	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
60.	*	0.7	0.7	0.7	0.6	0.5	0.5	0.4	0.4	0.2	0.	0.	0.	0.	0.1	0.1	0.1	0.2	0.2	0.2	0.2
70.	*	0.6	0.5	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.	0.	0.	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.3
80.	*	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.	0.	0.	0.1	0.1	0.2	0.2	0.2	0.4	0.5	0.5
90.	*	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.	0.	0.	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.7
100.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.	0.	0.	0.1	0.2	0.3	0.4	0.5	0.7	0.7	0.7
110.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.1	0.3	0.4	0.5	0.6	0.6	0.6	0.6
120.	*	0.1	0.	0.1	0.1	0.	0.1	0.1	0.1	0.1	0.	0.	0.	0.1	0.3	0.5	0.6	0.6	0.6	0.7	0.7
130.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.	0.	0.	0.1	0.3	0.5	0.6	0.6	0.6	0.6	0.6
140.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.	0.	0.	0.	0.3	0.5	0.6	0.6	0.6	0.6	0.6	0.6

```
150.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.     0.2    0.6    0.6    0.6
0.6    0.6    0.6    0.6
160.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.     0.5    0.6    0.6    0.6
0.6    0.6    0.6    0.6
170.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.2    0.5    0.6    0.6    0.6
0.6    0.6    0.6    0.6
180.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.3    0.6    0.6    0.7    0.6
0.6    0.6    0.6    0.6
190.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.4    0.6    0.7    0.7    0.7
0.7    0.7    0.7    0.6
200.  *    0.1     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.5    0.7    0.7    0.7    0.7
0.7    0.7    0.7    0.7
210.  *    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.6    0.7    0.7    0.7    0.7
0.7    0.7    0.7    0.7
220.  *    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.1    0.7    0.8    0.8    0.8    0.7
0.7    0.7    0.7    0.7
230.  *    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.2    0.9    0.9    0.9    0.9    0.9
0.9    0.9    0.8    0.9
240.  *    0.4    0.4    0.5    0.5    0.4    0.5    0.5    0.6    0.6    0.6    0.6     1.    0.9    0.9    0.9    0.9
0.9    0.9     1.    1.1
250.  *    0.8    0.8    0.9    0.9    0.9    0.8    0.8     1.    1.1    0.9    0.9    0.8    0.8    0.8    0.8    0.7
0.8     1.     1.    0.9
260.  *    1.1    1.2    1.2    1.2    1.1    1.1    1.1    1.1    1.2    1.3    1.1    0.6    0.6    0.6    0.6    0.6
0.6    0.6    0.5    0.6
270.  *    0.9     1.    1.1    1.1     1.     1.     1.    1.2    1.2    1.2    1.1    0.2    0.2    0.2    0.2    0.2
0.2    0.2    0.3    0.3
280.  *     1.     1.     1.     1.    0.9    0.9    0.9    1.1     1.     1.    0.9    0.1    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
290.  *    0.9    0.9    0.9    0.8    0.8    0.7    0.7    0.9    0.9    0.9    0.8     0.    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
300.  *    0.9    0.9    0.8    0.8    0.7    0.7    0.7    0.8    0.9    0.9    0.7     0.     0.     0.     0.     0.
0.     0.     0.    0.1
310.  *    0.8    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.4     0.     0.     0.     0.     0.
0.     0.     0.     0.
320.  *    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.4     0.     0.     0.     0.     0.
0.     0.     0.     0.
330.  *    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.3     0.     0.     0.     0.     0.
0.     0.     0.     0.
340.  *    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.3     0.     0.     0.     0.     0.
0.     0.     0.     0.
```

```
 350.  *    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.2     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 360.  *    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.1     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.1    1.2    1.2    1.2    1.1    1.1    1.1    1.2    1.2    1.3    1.1     1.    0.9    0.9    0.9    0.9
 0.9     1.     1.    1.1
 DEGR. *    260    260    260    260    260    260    260    270    260    260    260    240    230    230    230    230
 230    250    240    240
```



```
       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC101 REC102 REC103 REC104 REC105 REC106 REC107 REC108 REC109 REC110 REC111 REC112 REC113 REC114 REC115 REC116
 REC117 REC118 REC119 REC120

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.4    0.4    0.4    0.3    0.3
   0.4    0.4    0.6    0.7
  10.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.4    0.4    0.4    0.3    0.3
  0.6    0.7    0.8    0.8
  20.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.4    0.3    0.4    0.5
  0.7     1.    0.9     1.
  30.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.    0.5    0.4    0.5    0.7    0.8
  1.    0.9     1.    0.8
  40.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.7    0.7    0.8    0.7    0.8
  1.    0.9    0.7    0.8
```

```
 50.  *    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.7    0.9    0.8    0.8    0.9
 0.8    0.7    0.7    0.7
 60.  *    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.9    0.8    0.6    0.6    0.7
 0.7    0.6    0.5    0.6
 70.  *    0.4    0.4    0.4    0.5    0.7    0.7    0.7    0.8    0.8    0.9    0.9    0.5    0.4    0.4    0.5    0.7
 0.5    0.5    0.5    0.6
 80.  *    0.5    0.5    0.6    0.6    0.9    0.9     1.    1.1    1.1    1.2    1.3    0.4    0.3    0.3    0.6    0.6
 0.5    0.5    0.6    0.6
 90.  *    0.7    0.7    0.7    0.7     1.    1.1    1.2    1.3    1.3    1.4    1.4    0.4    0.5    0.4    0.6    0.5
 0.5    0.5    0.6    0.6
100.  *    0.7    0.7    0.7    0.8    1.1    1.2    1.3    1.3    1.3    1.4    1.4    0.5    0.4    0.4    0.5    0.5
0.5    0.5    0.6    0.6
110.  *    0.7    0.7    0.7    0.7    1.1    1.1    1.2    1.2    1.2    1.2    1.2    0.3    0.3    0.5    0.5    0.5
0.5    0.7    0.7    0.6
120.  *    0.6    0.6    0.6    0.6     1.    1.1    1.1    1.1    1.1    1.2    1.1    0.3    0.5    0.5    0.5    0.5
0.7    0.7    0.7    0.7
130.  *    0.6    0.6    0.6    0.6     1.    1.1    1.1    1.1    1.1    1.1    1.1    0.4    0.4    0.5    0.5    0.6
0.6    0.6    0.6    0.7
140.  *    0.6    0.6    0.6    0.6    1.1     1.     1.    1.1    1.1    1.1    0.9    0.3    0.4    0.4    0.4    0.6
0.6    0.7    0.7    0.7
150.  *    0.6    0.6    0.6    0.7    1.1     1.     1.     1.     1.    1.1    0.9    0.1    0.1    0.2    0.2    0.2
0.3    0.3    0.3    0.4
160.  *    0.6    0.6    0.6    0.7    1.1    1.1    1.1    1.1    1.1     1.    1.1     0.    0.1    0.1    0.1    0.1
0.2    0.2    0.3    0.4
170.  *    0.6    0.6    0.6    0.8    1.1    1.1    1.1    1.1    1.2    1.4     1.     0.     0.     0.     0.    0.1
0.1    0.1    0.1    0.3
180.  *    0.6    0.6    0.6    0.9    1.1     1.    1.2    1.2    1.4    1.3    1.1     0.     0.     0.     0.     0.
0.    0.1    0.1    0.1
190.  *    0.6    0.6    0.6    1.1    1.3    1.4    1.4    1.5    1.4    1.1    0.7     0.     0.     0.     0.     0.
0.     0.     0.    0.1
200.  *    0.7    0.6    0.9    1.2    1.5    1.4    1.3    1.4    1.2     1.    0.4     0.     0.     0.     0.     0.
0.     0.     0.    0.1
210.  *    0.8    0.8    0.9    1.2    1.3    1.3    1.3    1.2    0.9    0.8    0.4     0.     0.     0.     0.     0.
0.     0.     0.     0.
220.  *    0.7    0.7    0.9    1.3    1.3    1.2    1.1    1.1    1.1    0.7    0.6     0.     0.     0.     0.     0.
0.     0.     0.     0.
230.  *     1.    1.2    1.2    1.5    1.6    1.5    1.2    1.3    1.2     1.    0.7     0.     0.     0.     0.     0.
0.     0.     0.     0.
240.  *    1.2    1.4    1.5    1.7    1.6    1.6    1.5    1.4    1.2     1.    0.8     0.     0.     0.     0.     0.
0.     0.     0.     0.
```

```
 250.  *    1.1    1.2    1.3    1.5    1.6    1.2    1.1    1.1    0.9    0.9    0.8    0.3    0.2    0.1    0.1    0.1
 0.1     0.     0.     0.
 260.  *    0.6    0.6    0.6    0.8    0.9    0.7    0.7    0.7    0.5    0.5    0.4    0.6    0.4    0.4    0.3    0.3
 0.2    0.1    0.1    0.1
 270.  *    0.3    0.3    0.3    0.5    0.5    0.2    0.2    0.2    0.3    0.3    0.2    0.8    0.7    0.6    0.4    0.4
 0.3    0.3    0.3    0.2
 280.  *    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.2    0.4    0.3    0.4    0.9    0.7    0.7    0.6    0.6
 0.5    0.3    0.3    0.3
 290.  *    0.1    0.1    0.1    0.3    0.3    0.2    0.2    0.2    0.2    0.3    0.3    0.8    0.7    0.6    0.6    0.6
 0.4    0.4    0.4    0.3
 300.  *    0.1    0.1    0.1    0.1    0.2    0.1    0.2    0.2    0.2    0.2    0.3    0.8    0.7    0.7    0.6    0.4
 0.4    0.4    0.4    0.5
 310.  *     0.     0.     0.     0.     0.     0.     0.    0.2    0.2    0.2    0.2    0.7    0.7    0.7    0.5    0.5
 0.4    0.4    0.4    0.4
 320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.2    0.2    0.7    0.7    0.5    0.5    0.5
 0.4    0.3    0.4    0.4
 330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.7    0.5    0.5    0.5    0.5
 0.3    0.2    0.2    0.3
 340.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.6    0.6    0.4    0.3    0.3
 0.5    0.3    0.4    0.5
 350.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.6    0.4    0.3    0.4    0.4
 0.4    0.4    0.3    0.6
 360.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.4    0.4    0.4    0.3    0.3
 0.4    0.4    0.6    0.7

 ------*-----------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *    1.2    1.4    1.5    1.7    1.6    1.6    1.5    1.5    1.4    1.4    1.4    0.9    0.9    0.8    0.8    0.9
 1.     1.     1.     1.
 DEGR. *    240    240    240    240    230    240    240    190    180     90     90     60     50     40     50     50
 30     20     30     20
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND * CONCENTRATION
ANGLE * (PPM)
(DEGR)* REC121 REC122 REC123 REC124 REC125 REC126 REC127 REC128 REC129 REC130 REC131 REC132 REC133 REC134 REC135 REC136 REC137 REC138 REC139 REC140

.	*	0.7	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.4	0.4	0.4	0.5	0.6	0.6	0.7	0.8	0.8	0.8	1.
10.	*	1.	1.	1.1	1.	1.	1.	1.	1.	0.9	0.1	0.2	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.7
20.	*	1.	1.1	1.	1.	1.1	1.1	1.	0.9	0.8	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.4	0.4	0.6	0.6
30.	*	0.9	0.9	0.9	1.	1.	1.	0.9	0.8	0.5	0.	0.	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.5	0.5
40.	*	0.8	0.7	0.8	0.8	0.7	0.6	0.6	0.5	0.3	0.	0.	0.	0.	0.	0.	0.1	0.1	0.2	0.3	0.3
50.	*	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.3	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2
60.	*	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.3	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
70.	*	0.6	0.6	0.6	0.6	0.6	0.6	0.3	0.3	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
80.	*	0.6	0.6	0.6	0.6	0.6	0.5	0.3	0.3	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
90.	*	0.6	0.6	0.6	0.6	0.6	0.3	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
100.	*	0.6	0.6	0.6	0.6	0.5	0.3	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1
110.	*	0.6	0.6	0.7	0.7	0.4	0.4	0.2	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2
120.	*	0.7	0.7	0.6	0.5	0.4	0.3	0.3	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.2	0.2
130.	*	0.7	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.	0.	0.	0.	0.	0.	0.2	0.2	0.2	0.2	0.3	0.3
140.	*	0.7	0.5	0.4	0.3	0.3	0.3	0.2	0.1	0.	0.	0.	0.	0.1	0.3	0.3	0.3	0.4	0.4	0.5	0.5

150.	*	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.1	0.	0.	0.1	0.2	0.3	0.3	0.4	0.6	
0.7	0.7	0.8	1.															
160.	*	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.	0.	0.1	0.2	0.3	0.5	0.7	0.9	
1.2	1.2	1.3	1.3															
170.	*	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.	0.	0.1	0.2	0.4	0.7	1.	1.3	
1.6	1.6	1.7	1.8															
180.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.1	0.2	0.5	0.8	1.3	1.4	
1.6	1.7	1.7	1.7															
190.	*	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.1	0.2	0.6	1.	1.3	1.4	
1.6	1.6	1.6	1.6															
200.	*	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.3	0.7	1.	1.1	1.3	
1.4	1.4	1.4	1.3															
210.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.3	0.8	1.1	1.1	1.	
1.	1.	1.	1.															
220.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.3	0.7	1.1	1.1	1.	
1.	1.	0.9	0.9															
230.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.3	0.8	0.9	0.9	0.9	
0.9	0.9	0.9	0.9															
240.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.4	0.8	0.9	0.9	0.9	
0.9	0.9	0.9	0.9															
250.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.3	0.5	0.9	0.9	1.	0.9	
0.9	0.9	0.9	0.9															
260.	*	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.2	0.3	0.5	0.9	0.9	0.9	1.	
1.	1.	1.	1.															
270.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.4	0.5	0.8	1.	1.	1.	1.	
1.	1.1	1.2	1.2															
280.	*	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.5	0.9	1.1	1.1	1.3	1.3	
1.3	1.2	1.2	1.2															
290.	*	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.4	0.5	1.	1.3	1.3	1.3	1.4	
1.4	1.4	1.4	1.3															
300.	*	0.5	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.6	0.8	1.2	1.4	1.4	1.4	1.5	
1.4	1.4	1.4	1.5															
310.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	1.	1.1	1.6	1.7	1.7	1.7	1.6	
1.6	1.5	1.6	1.7															
320.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	1.1	1.3	1.7	1.7	1.7	1.6	1.5	
1.6	1.7	1.7	1.7															
330.	*	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	1.	1.3	1.6	1.6	1.6	1.8	1.9	
1.8	1.7	1.8	1.8															
340.	*	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.9	1.2	1.2	1.2	1.3	1.3	1.4	
1.5	1.6	1.5	1.4															

```
 350.  *    0.7    0.7    0.7    0.5    0.7    0.7    0.7    0.7    0.7    0.5    0.6    0.8    0.8    0.9    0.9    0.9
 0.9    0.9     1.    1.1
 360.  *    0.7    0.8    0.8    0.8    0.8    0.8    0.9    0.9    0.9    0.4    0.4    0.4    0.5    0.6    0.6    0.7
 0.8    0.8    0.8     1.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *     1.    1.1    1.1     1.    1.1    1.1     1.     1.    0.9    1.1    1.3    1.7    1.7    1.7    1.8    1.9
 1.8    1.7    1.8    1.8
 DEGR. *     10     20     10     10     20     20     10     10      0    320    320    320    310    310    330    330
 330    180    330    170
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC141	REC142	REC143	REC144	REC145	REC146
.	*	0.6	0.5	0.6	0.7	0.8	0.7
10.	*	0.6	0.5	0.5	0.6	0.7	0.8
20.	*	0.4	0.4	0.6	0.6	0.6	0.8
30.	*	0.4	0.5	0.5	0.6	0.7	0.7
40.	*	0.4	0.4	0.4	0.4	0.7	0.8
50.	*	0.2	0.2	0.4	0.4	0.5	0.6
60.	*	0.1	0.1	0.1	0.3	0.3	0.5
70.	*	0.	0.	0.	0.1	0.1	0.2
80.	*	0.	0.	0.	0.	0.	0.1
90.	*	0.	0.	0.	0.	0.	0.
100.	*	0.	0.	0.	0.	0.	0.
110.	*	0.	0.	0.	0.	0.	0.
120.	*	0.	0.	0.	0.	0.	0.

130.	*	0.1	0.	0.	0.	0.	0.
140.	*	0.2	0.1	0.	0.	0.	0.
150.	*	0.6	0.2	0.2	0.	0.	0.
160.	*	1.	0.7	0.5	0.3	0.1	0.
170.	*	1.4	1.	0.9	0.6	0.4	0.2
180.	*	1.5	1.3	1.	0.8	0.7	0.5
190.	*	1.3	1.	0.8	0.8	0.8	0.6
200.	*	1.1	1.	0.8	0.8	0.8	0.6
210.	*	1.	0.9	0.8	0.8	0.7	0.5
220.	*	1.	0.8	0.8	0.8	0.7	0.5
230.	*	0.9	0.8	0.9	0.7	0.5	0.5
240.	*	0.9	0.8	0.8	0.6	0.5	0.5
250.	*	0.9	0.9	0.9	0.7	0.7	0.7
260.	*	1.1	1.2	1.2	1.	0.8	0.9
270.	*	1.2	1.3	1.1	1.	1.	0.9
280.	*	1.4	1.4	1.1	1.	0.9	0.6
290.	*	1.5	1.3	1.	0.9	0.7	0.3
300.	*	1.6	1.3	0.9	0.5	0.3	0.5
310.	*	1.2	0.9	0.6	0.5	0.6	0.5
320.	*	1.2	1.	0.6	0.5	0.5	0.6
330.	*	1.1	0.8	0.4	0.4	0.4	0.5
340.	*	0.9	0.5	0.2	0.4	0.4	0.6
350.	*	0.8	0.5	0.4	0.5	0.7	0.7
360.	*	0.6	0.5	0.6	0.7	0.8	0.7
MAX	*	1.6	1.4	1.2	1.	1.	0.9
DEGR.	*	300	280	260	260	270	260

THE HIGHEST CONCENTRATION OF 1.90 ppm OCCURRED AT RECEPTOR REC64.

FF

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**********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/6/2012 2:15:39 PM
** File: F:\2975 FirstLight\Microscale\Worst\34 Dean Longmeadow & Owen LOS&ADT\2022NBPM.ou2
**
**********************************************
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 NB PM RUN: CAL3QHC RUN

DATE : 12/ 6/12
TIME : 14:15:37

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE
VPH EF H W V/C QUEUE	*	X1	Y1	X2	Y2	*	(M)		
	*	(DEG)	(G/MI)	(M)	(M)	(VEH)			
1. Dean EB LL	*	235106.84	850497.38	235156.62	850512.50	*	52.	73.	AG
11. 8.5 0.0 9.0									
2. Dean EB LL QUEUE	*	235156.62	850512.50	235153.28	850511.50	*	3.	253.	AG
116. 100.0 0.0 3.0 0.73 0.6									
3. Dean EB TR	*	235066.06	850482.19	235155.91	850506.75	*	93.	75.	AG

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 1057.   8.5   0.0   13.4
 4. Dean EB TR QUEUE                    *  235155.91    850506.75   234893.69    850435.06 *     272.   255. AG
 172. 100.0   0.0    7.4 1.11  45.3
 5. Dean WB LL                          *  235225.55    850536.69   235185.14    850524.44 *      42.   253. AG
 390.   8.5   0.0    9.4
 6. Dean WB LL QUEUE                    *  235185.14    850524.44   235721.95    850687.19 *     561.    73. AG
 102. 100.0   0.0    3.4 1.65  93.5
 7. Dean WB TR                          *  235275.70    850557.25   235185.14    850530.19 *      95.   253. AG
 1165.   8.5   0.0   13.4
 8. Dean WB TR QUEUE                    *  235185.14    850530.19   235241.83    850547.12 *      59.    73. AG
 125. 100.0   0.0    7.4 0.69   9.9
 9. Owen NB LL                          *  235207.16    850428.06   235179.00    850508.50 *      85.   341. AG
 29.   8.5   0.0    9.7
10. Owen NB LL QUEUE                    *  235179.00    850508.50   235180.44    850504.38 *       4.   161. AG
92. 100.0   0.0    3.7 0.08   0.7
11. Owen NB T                           *  235208.59    850429.88   235181.17    850508.88 *      84.   341. AG
300.   8.5   0.0    9.7
12. Owen NB T QUEUE                     *  235181.17    850508.88   235196.95    850463.38 *      48.   161. AG
92. 100.0   0.0    3.7 0.79   8.0
13. Owen NB R                           *  235207.52    850436.38   235189.47    850493.75 *      60.   343. AG
310.   8.5   0.0    9.7
14. Owen NB R QUEUE                     *  235189.47    850493.75   235204.77    850445.12 *      51.   163. AG
92. 100.0   0.0    3.7 0.82   8.5
15. Longmeadow SB L                     *  235147.36    850577.25   235162.05    850535.25 *      44.   161. AG
149.   8.5   0.0    9.0
16. Longmeadow SB L QUEUE               *  235162.05    850535.25   235154.78    850556.38 *      22.   341. AG
92. 100.0   0.0    3.0 0.39   3.7
17. Longmeadow SB TR                    *  235134.16    850612.38   235159.88    850533.06 *      83.   162. AG
392.   8.5   0.0    9.0
18. Longmeadow SB TR QUEUE              *  235159.88    850533.06   235120.36    850654.44 *     128.   342. AG
92. 100.0   0.0    3.0 1.03  21.3
19. Dean EB OUTBOUND                    *  235195.64    850518.06   235273.02    850547.94 *      83.    69. AG
1340.   8.5   0.0   13.4
20. Dean WB OUTBOUND                    *  235156.41    850522.00   235064.98    850493.25 *      96.   253. AG
965.   8.5   0.0   13.4
21. Longmeadow NB OUTBOUND              *  235170.09    850535.00   235137.33    850611.62 *      83.   337. AG
559.   8.5   0.0    9.0
22. Owen SB OUTBOUND                    *  235175.48    850492.88   235201.41    850426.62 *      71.   159. AG
939.   8.5   0.0    9.7
23. EBL                                 *  235157.16    850512.56   235169.77    850534.62 *      25.    30. AG
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11.   9.4   0.0    9.0
24. EBT                          *  235156.48    850506.94   235194.47    850517.81 *      40.     74. AG
881.   8.5   0.0   12.0
25. EBR                          *  235146.28    850504.06   235174.59    850494.12 *      30.    109. AG
176.  10.3   0.0    9.0
26. WBL                          *  235183.81    850524.38   235172.95    850497.75 *      29.    202. AG
390.   9.4   0.0    9.0
27. WBT                          *  235184.27    850530.12   235156.48    850522.06 *      29.    254. AG
917.   8.5   0.0   12.0
28. WBR                          *  235184.27    850529.44   235168.45    850535.38 *      17.    291. AG
248.  10.3   0.0    9.0
29. NBL                          *  235178.67    850509.50   235156.05    850521.88 *      26.    299. AG
29.   9.4   0.0    9.0
30. NBT                          *  235180.75    850510.00   235170.09    850534.50 *      27.    336. AG
300.   8.5   0.0    9.0
31. NBR                          *  235188.33    850495.06   235198.97    850518.94 *      26.     24. AG
310.  10.3   0.0    9.0
32. SBL                          *  235162.09    850534.69   235188.55    850516.94 *      32.    124. AG
149.   9.4   0.0    9.0
33. SBT                          *  235159.89    850532.50   235173.73    850497.75 *      37.    158. AG
373.   8.5   0.0    9.0
34. SBR                          *  235160.44    850532.31   235155.61    850521.56 *      12.    204. AG
19.  10.3   0.0    9.0
```


JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 NB PM RUN: CAL3QHC
RUN

DATE : 12/ 6/12
TIME : 14:15:37

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Dean EB LL QUEUE	*	120	113	4.0	11	1900	45.89	3	3

4. Dean EB TR QUEUE	*	120	84	4.0	1057	1900	45.89	3	3
6. Dean WB LL QUEUE	*	120	99	4.0	390	1900	45.89	3	3
8. Dean WB TR QUEUE	*	120	61	4.0	1165	1900	45.89	3	3
10. Owen NB LL QUEUE	*	120	90	4.0	29	1900	45.89	3	3
12. Owen NB T QUEUE	*	120	90	4.0	300	1900	45.89	3	3
14. Owen NB R QUEUE	*	120	90	4.0	310	1900	45.89	3	3
16. Longmeadow SB L QUEUE	*	120	90	4.0	149	1900	45.89	3	3
18. Longmeadow SB TR QUEUE	*	120	90	4.0	392	1900	45.89	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235178.36	850537.06	1.8	*
2. LR_2	*	235171.39	850540.94	1.8	*
3. LR_3	*	235169.19	850544.88	1.8	*
4. LR_4	*	235166.98	850548.81	1.8	*
5. LR_5	*	235163.70	850553.81	1.8	*
6. LR_6	*	235161.97	850558.50	1.8	*
7. LR_7	*	235160.23	850563.19	1.8	*
8. LR_8	*	235158.48	850567.88	1.8	*
9. LR_9	*	235156.75	850572.56	1.8	*
10. LR_10	*	235155.02	850577.25	1.8	*
11. LR_11	*	235153.27	850581.94	1.8	*
12. LR_12	*	235151.53	850586.62	1.8	*
13. LR_13	*	235149.80	850591.31	1.8	*
14. LR_14	*	235148.05	850596.00	1.8	*
15. LR_15	*	235146.31	850600.69	1.8	*
16. LR_16	*	235144.56	850605.38	1.8	*
17. LR_17	*	235142.83	850610.06	1.8	*
18. LR_18	*	235130.50	850610.00	1.8	*
19. LR_19	*	235132.23	850605.31	1.8	*
20. LR_20	*	235133.98	850600.62	1.8	*
21. LR_21	*	235135.72	850595.94	1.8	*
22. LR_22	*	235137.45	850591.25	1.8	*
23. LR_23	*	235139.20	850586.56	1.8	*
24. LR_24	*	235140.94	850581.88	1.8	*
25. LR_25	*	235142.69	850577.19	1.8	*

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 NB PM RUN: CAL3QHC RUN

RECEPTOR	COORDINATES (M) X	Y	Z
26. LR_26	235144.42	850572.50	1.8
27. LR_27	235146.16	850567.81	1.8
28. LR_28	235147.91	850563.12	1.8
29. LR_29	235149.64	850558.44	1.8
30. LR_30	235151.38	850553.75	1.8
31. LR_31	235153.12	850549.06	1.8
32. LR_32	235154.86	850544.38	1.8
33. LR_33	235154.91	850539.38	1.8
34. LR_34	235156.66	850534.69	1.8
35. LR_35	235153.22	850528.19	1.8
36. LR_36	235149.31	850523.50	1.8
37. LR_37	235144.55	850522.06	1.8
38. LR_38	235139.75	850520.56	1.8
39. LR_39	235134.97	850519.12	1.8
40. LR_40	235130.19	850517.69	1.8
41. LR_41	235125.41	850516.25	1.8
42. LR_42	235120.62	850514.75	1.8
43. LR_43	235115.83	850513.31	1.8
44. LR_44	235111.05	850511.88	1.8
45. LR_45	235106.27	850510.38	1.8
46. LR_46	235101.48	850508.94	1.8
47. LR_47	235096.70	850507.50	1.8
48. LR_48	235091.92	850506.00	1.8
49. LR_49	235087.12	850504.56	1.8
50. LR_50	235082.34	850503.12	1.8
51. LR_51	235077.56	850501.69	1.8
52. LR_52	235072.78	850500.19	1.8
53. LR_53	235068.00	850498.75	1.8
54. LR_54	235063.20	850497.31	1.8
55. LR_55	235073.41	850479.50	1.8
56. LR_56	235078.19	850480.94	1.8
57. LR_57	235082.97	850482.38	1.8
58. LR_58	235087.75	850483.81	1.8
59. LR_59	235092.55	850485.31	1.8

60. LR_60	*	235097.31	850486.75	1.8 *
61. LR_61	*	235102.09	850488.19	1.8 *
62. LR_62	*	235107.00	850489.25	1.8 *
63. LR_63	*	235111.78	850490.69	1.8 *
64. LR_64	*	235116.56	850492.12	1.8 *
65. LR_65	*	235121.34	850493.56	1.8 *
66. LR_66	*	235126.88	850494.75	1.8 *
67. LR_67	*	235131.12	850496.00	1.8 *
68. LR_68	*	235135.80	850497.12	1.8 *
69. LR_69	*	235140.27	850497.81	1.8 *
70. LR_70	*	235145.27	850497.75	1.8 *
71. LR_71	*	235149.83	850496.81	1.8 *
72. LR_72	*	235153.11	850496.06	1.8 *
73. LR_73	*	235156.19	850495.12	1.8 *
74. LR_75	*	235202.16	850511.88	1.8 *
75. LR_76	*	235204.62	850514.00	1.8 *
76. LR_77	*	235207.84	850516.75	1.8 *
77. LR_79	*	235212.31	850520.25	1.8 *
78. LR_80	*	235217.08	850521.75	1.8 *

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 NB PM RUN: CAL3QHC
RUN

RECEPTOR	*	X	Y	Z *
	*	COORDINATES (M)		*
79. LR_81	*	235221.84	850523.25	1.8 *
80. LR_82	*	235226.45	850524.75	1.8 *
81. LR_83	*	235231.23	850526.25	1.8 *
82. LR_84	*	235236.00	850527.75	1.8 *
83. LR_85	*	235240.45	850530.38	1.8 *
84. LR_86	*	235245.23	850531.88	1.8 *
85. LR_87	*	235249.98	850533.38	1.8 *
86. LR_88	*	235254.45	850535.50	1.8 *
87. LR_89	*	235259.22	850537.00	1.8 *
88. LR_90	*	235263.38	850541.00	1.8 *
89. LR_91	*	235268.14	850542.50	1.8 *
90. LR_92	*	235272.91	850544.00	1.8 *
91. LR_93	*	235277.69	850545.50	1.8 *
92. LR_94	*	235275.39	850561.56	1.8 *

93. LR_95	*	235270.62	850560.06	1.8	*
94. LR_96	*	235265.86	850558.56	1.8	*
95. LR_97	*	235261.09	850557.00	1.8	*
96. LR_98	*	235256.31	850555.50	1.8	*
97. LR_99	*	235251.56	850554.00	1.8	*
98. LR_100	*	235246.80	850552.50	1.8	*
99. LR_101	*	235242.02	850551.00	1.8	*
**. LR_102	*	235237.27	850549.50	1.8	*
**. LR_103	*	235232.48	850548.00	1.8	*
**. LR_104	*	235227.72	850546.50	1.8	*
**. LR_105	*	235222.95	850545.00	1.8	*
**. LR_106	*	235218.19	850543.44	1.8	*
**. LR_107	*	235213.42	850541.94	1.8	*
**. LR_108	*	235208.66	850541.38	1.8	*
**. LR_109	*	235202.81	850539.88	1.8	*
**. LR_110	*	235198.05	850538.38	1.8	*
**. LR_111	*	235194.19	850537.31	1.8	*
**. LR_112	*	235189.44	850535.81	1.8	*
**. LR_113	*	235184.66	850534.31	1.8	*
**. LR_114	*	235159.12	850493.88	1.8	*
**. LR_115	*	235161.91	850492.31	1.8	*
**. LR_116	*	235165.55	850490.00	1.8	*
**. LR_117	*	235168.09	850487.94	1.8	*
**. LR_118	*	235170.88	850485.00	1.8	*
**. LR_119	*	235173.97	850481.00	1.8	*
**. LR_120	*	235176.31	850476.75	1.8	*
**. LR_121	*	235178.02	850473.00	1.8	*
**. LR_122	*	235181.77	850468.19	1.8	*
**. LR_123	*	235183.45	850463.50	1.8	*
**. LR_124	*	235185.16	850458.81	1.8	*
**. LR_125	*	235186.86	850454.12	1.8	*
**. LR_126	*	235188.56	850449.38	1.8	*
**. LR_127	*	235190.27	850444.69	1.8	*
**. LR_128	*	235191.95	850440.00	1.8	*
**. LR_129	*	235193.66	850435.31	1.8	*
**. LR_130	*	235195.36	850430.56	1.8	*
**. LR_131	*	235197.06	850425.88	1.8	*
**. LR_132	*	235211.48	850433.06	1.8	*
**. LR_133	*	235209.78	850437.75	1.8	*

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 NB PM RUN: CAL3QHC
RUN

RECEPTOR	COORDINATES (M) X	Y	Z
**. LR_134	235208.08	850442.50	1.8
**. LR_135	235206.38	850447.19	1.8
**. LR_136	235204.69	850451.88	1.8
**. LR_137	235202.98	850456.56	1.8
**. LR_138	235201.28	850461.25	1.8
**. LR_139	235199.58	850466.00	1.8
**. LR_140	235197.88	850470.69	1.8
**. LR_141	235196.19	850475.38	1.8
**. LR_142	235194.48	850480.06	1.8
**. LR_143	235194.25	850485.06	1.8
**. LR_144	235194.02	850489.75	1.8
**. LR_145	235194.09	850494.19	1.8
**. LR_146	235194.45	850498.88	1.8
**. LR_147	235195.98	850503.62	1.8
**. LR_148	235199.00	850508.31	1.8

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	0.	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.				

```
    0.    0.3    0.5    0.6
  10.  *     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.
  0.    0.3    0.4    0.6
  20.  *     0.     0.     0.     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.
  0.    0.3    0.4    0.5
  30.  *     0.     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.    0.3    0.5    0.5
  40.  *     0.     0.     0.     0.    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.    0.3    0.5    0.5
  50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.    0.2    0.5    0.5
  60.  *    0.1     0.     0.     0.    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.    0.3    0.5    0.5
  70.  *    0.4    0.2    0.1    0.1    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
  0.    0.3    0.4    0.5
  80.  *     1.    0.6    0.4    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.
  0.    0.4    0.5    0.5
  90.  *    1.2    0.8    0.7    0.5    0.5    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
  0.1    0.5    0.6    0.6
 100.  *    1.3     1.    0.7    0.6    0.6    0.4    0.4    0.4    0.3    0.2    0.2    0.1    0.1    0.1    0.1    0.1
 0.1    0.6    0.7    0.6
 110.  *    1.1    0.8    0.7    0.6    0.7    0.5    0.5    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.1    0.1
 0.1    0.6    0.7    0.8
 120.  *    1.1    0.8    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.4    0.4    0.3    0.3
 0.3    0.8    0.9     1.
 130.  *    0.9    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.3
 0.3     1.     1.     1.
 140.  *    0.8    0.6    0.7    0.7    0.7    0.6    0.6    0.6    0.6    0.5    0.4    0.4    0.4    0.4    0.4    0.4
 0.4    0.8    0.8    0.8
 150.  *    0.7    0.7    0.5    0.5    0.4    0.4    0.4    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2
 0.2    0.8    0.8    0.8
 160.  *    0.8     1.    0.9    0.8    0.7    0.7    0.7    0.7    0.6    0.5    0.5    0.4    0.4    0.4    0.5    0.5
 0.5    0.6    0.6    0.6
 170.  *    0.9    0.9    0.8    0.6    0.7    0.7    0.8    0.8    0.7    0.7    0.6    0.6    0.6    0.6    0.6    0.6
 0.6    0.3    0.3    0.3

------*-----------------------------------------------------------------------------------------------------------------
--------------------
MAX   *    1.3     1.    0.9    0.8    0.7    0.7    0.8    0.8    0.7    0.7    0.6    0.6    0.6    0.6    0.6    0.6
 0.6     1.     1.     1.
```

DEGR. * 100 100 160 160 110 160 170 170 170 170 170 170 170 170 170 170
170 130 130 120

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
*	REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
REC17	REC18	REC19	REC20													
180. *	0.8	0.8	0.6	0.5	0.6	0.6	0.9	0.8	0.7	0.8	0.8	0.8	0.7	0.7	0.7	0.7
0.7	0.2	0.3	0.3													
190. *	0.7	0.7	0.5	0.7	0.9	0.9	1.	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8
0.8	0.3	0.3	0.3													
200. *	0.6	0.8	0.6	0.8	0.9	1.	1.	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
0.7	0.1	0.2	0.2													
210. *	0.9	0.9	0.8	0.9	1.	1.1	1.	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.6
0.6	0.1	0.1	0.1													
220. *	1.1	0.7	0.8	1.	1.	1.	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.6
0.6	0.1	0.1	0.1													
230. *	1.	0.9	1.	1.	1.	1.	0.8	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
0.6	0.1	0.1	0.1													
240. *	1.	1.	1.	0.9	0.8	0.7	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.5
0.5	0.	0.	0.													
250. *	0.7	0.8	0.8	0.7	0.7	0.6	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5
0.5	0.	0.	0.													
260. *	0.5	0.7	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5
0.5	0.	0.	0.													
270. *	0.4	0.5	0.5	0.6	0.5	0.3	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

```
0.4     0.     0.     0.
280.  *    0.4    0.6    0.6    0.6    0.5    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5
0.4     0.     0.     0.
290.  *    0.4    0.5    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5
0.3     0.     0.     0.
300.  *    0.5    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5
0.3     0.     0.     0.
310.  *    0.5    0.7    0.7    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.4
0.3     0.     0.     0.
320.  *    0.4    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.5    0.3
0.3     0.     0.     0.
330.  *    0.2    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.4    0.4    0.3
0.2    0.1    0.1    0.2
340.  *    0.2    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.2    0.2
0.1    0.2    0.3    0.3
350.  *     0.    0.2    0.2    0.2    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1     0.
0.    0.3    0.4    0.4
360.  *     0.    0.1    0.1    0.1    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.
0.    0.3    0.5    0.6

------*-------------------------------------------------------------------------------------------------------------------
--------------------
MAX   *    1.3     1.     1.     1.     1.    1.1     1.    0.9    0.9    0.9    0.8    0.8    0.8    0.8    0.8    0.8
0.8     1.     1.     1.
DEGR. *    100    100    230    220    210    210    190    190    190    190    180    180    190    190    190    190
190    130    130    120

      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
```

```
 REC37  REC38  REC39  REC40

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.6    0.7    0.7    0.8    0.8    0.8    0.8    0.9     1.    1.1    1.2    1.3    1.1    1.1    0.6    0.4
    0.3    0.1    0.1    0.1

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.6    0.7    0.7    0.8    0.8    0.8    0.8    0.9     1.    1.1    1.2    1.3    1.1    1.1    0.6    0.4
 0.3    0.1    0.1    0.1
 DEGR. *      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
 0      0      0      0
```



```
       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
 REC37  REC38  REC39  REC40

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
  10.  *    0.7    0.7    0.7    0.7    0.8    0.9    0.8    0.9    0.9    0.9    1.1    1.3     1.    1.1    0.5    0.5
  0.3    0.3    0.1    0.1
  20.  *    0.6    0.6    0.7    0.7    0.7    0.6    0.6    0.7    0.7    0.8     1.    1.1     1.    1.1    0.6    0.5
  0.5    0.4    0.3    0.2
  30.  *    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.6    0.7    0.7    0.9     1.    0.7    0.8    0.5    0.5
  0.5    0.5    0.3    0.2
  40.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.7    0.9    0.9    0.7    0.7    0.4    0.4
  0.4    0.4    0.4    0.3
```

```
 50.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.8    0.8    0.7    0.7    0.4    0.5
 0.3    0.4    0.4    0.4
 60.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.7    0.7    0.8    0.7    0.7    0.5    0.6
 0.6    0.6    0.4    0.4
 70.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.7    0.9    0.9    0.9     1.    0.7    1.1
 0.9    0.8    0.8    0.8
 80.  *    0.5    0.5    0.5    0.6    0.6    0.6    0.6    0.6    0.6    0.8     1.    1.1    1.2    1.3     1.    1.3
 1.1     1.    0.9    1.1
 90.  *    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.7    0.7    1.1    1.2    1.3    1.4    1.3    1.2    1.1
 1.    0.9     1.     1.
100.  *    0.6    0.6    0.6    0.7    0.7    0.8    0.9    0.9     1.    1.2    1.4    1.5    1.4    0.8    0.9    0.8
0.7    0.6    0.7    0.7
110.  *    0.8    0.9    0.9    0.9    0.9     1.    1.1    1.1    1.2    1.4    1.4    1.4    1.2    1.3    0.6    0.6
0.6    0.4    0.7    0.7
120.  *     1.     1.     1.    1.1    1.1    1.2    1.1    1.2    1.3    1.4    1.6    1.6    0.8     1.    0.4    0.7
0.5    0.7    0.8    0.8
130.  *    1.1    1.1    1.1    1.2    1.3    1.3    1.3    1.4    1.6    1.6    1.3    1.3    0.9    0.6    0.6    0.7
0.8    0.9    0.8    0.9
140.  *    0.8    0.8    0.8    0.8    0.9     1.    1.1    1.2    1.4    1.4    1.4    1.2    0.9    0.7    0.8    0.6
0.8    0.6    0.8    0.8
150.  *    0.7    0.7    0.8    0.8     1.    1.1    1.2    1.3    1.3    1.5    1.6    1.4    0.9    0.8    0.7    0.7
0.6    0.8    0.7    0.7
160.  *    0.6    0.6    0.7    0.7    0.7    0.8     1.    1.1    1.1    1.2    1.2    1.1    0.6    0.5    0.5    0.8
0.6    0.7    0.7    0.7
170.  *    0.4    0.5    0.5    0.5    0.5    0.5    0.6    0.7    0.7    0.8    0.9    0.9    0.7    0.5    0.5    0.5
0.7    0.7    0.7    0.7
180.  *    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.7    0.5    0.6    0.5    0.7
0.7    0.7    0.7    0.7
190.  *    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.4    0.5    0.5    0.8
0.8    0.8    0.8    0.8
200.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.5    0.5    0.6    0.5    0.5    0.8    0.8
0.8    0.8    0.8    0.8
210.  *    0.1    0.2    0.2    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.5    0.6    0.5    0.5    0.8    0.8
0.8    0.8    0.8    0.8
220.  *    0.1    0.1    0.1    0.1    0.2    0.2    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.7    0.9    0.9
0.9    0.9    0.9    0.9
230.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.3    0.4    0.4    0.5    0.6    0.7    0.9     1.
1.1    1.1     1.     1.
240.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.3    0.4    0.5    0.6    0.8    1.1
1.1    1.1    1.1     1.
```

```
 250.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.2    0.3    0.4    0.7    0.9
 0.9    0.9    0.9    0.9
 260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.5
 0.5    0.5    0.5    0.5
 270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3
 0.3    0.3    0.3    0.3
 280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2
 0.1    0.1    0.1    0.1
 290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 310.  *     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.2    0.2    0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 320.  *     0.    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.1    0.2    0.     0.1
 0.     0.     0.     0.
 330.  *    0.2    0.2    0.2    0.2    0.3    0.3    0.4    0.4    0.5    0.5    0.6    0.6    0.3    0.4    0.     0.1
 0.     0.     0.     0.
 340.  *    0.3    0.4    0.5    0.5    0.6    0.7    0.7    0.7    0.8    0.8     1.    1.2    0.7    0.8    0.2    0.2
 0.     0.     0.     0.
 350.  *    0.4    0.7    0.7    0.7    0.8    0.8    0.8    0.9     1.    1.1    1.1    1.3     1.     1.    0.4    0.2
 0.1    0.1    0.1     0.
 360.  *    0.6    0.7    0.7    0.8    0.8    0.8    0.8    0.9     1.    1.1    1.2    1.3    1.1    1.1    0.6    0.4
 0.3    0.1    0.1    0.1

 ------*-----------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *    1.1    1.1    1.1    1.2    1.3    1.3    1.3    1.4    1.6    1.6    1.6    1.6    1.4    1.3    1.2    1.3
 1.1    1.1    1.1    1.1
 DEGR. *    130    130    130    130    130    130    130    130    130    130    120    120     90     80     90     80
 80    230    240     80
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	*	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.1	1.1	1.1	1.1	1.1	1.1
10.	*	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.1	1.1	1.1	1.1	1.1	1.1
20.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	1.1	1.1	1.1	1.2	1.2	1.2
30.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	1.2	1.2	1.2	1.2	1.2	1.2
40.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.4	1.4	1.4	1.4	1.4	1.4
50.	*	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.6	1.6	1.6	1.6	1.6	1.7
60.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	1.8	1.8	1.8	1.8	1.9	1.9
70.	*	0.9	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.8	0.8	0.7	0.7	1.9	1.9	1.9	1.9	1.9	2.
80.	*	1.	1.	1.	1.1	1.	1.1	1.1	1.1	1.	1.	1.1	1.1	1.	0.9	1.1	1.1	1.2	1.2	1.2	1.3
90.	*	0.9	1.	0.9	0.9	1.1	1.1	0.8	0.9	1.	1.	1.	1.	1.	1.	0.5	0.5	0.5	0.6	0.6	0.6
100.	*	0.7	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.	1.	1.	1.	0.2	0.2	0.3	0.3	0.3	0.3
110.	*	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.	1.	1.	1.	0.9	0.1	0.1	0.1	0.1	0.2	0.2
120.	*	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.1	0.1	0.1	0.1	0.1	0.2
130.	*	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.	0.1	0.1	0.1	0.1	0.1
140.	*	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.	0.	0.	0.	0.	0.

```
150.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.8    0.8    0.7     0.     0.
0.     0.     0.     0.
160.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.5     0.     0.
0.     0.     0.     0.
170.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.5     0.     0.
0.     0.     0.     0.
180.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.8    0.7    0.6    0.3     0.     0.
0.     0.     0.     0.
190.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.6    0.3     0.     0.
0.     0.     0.     0.
200.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.5    0.3     0.     0.
0.1    0.1    0.1    0.1
210.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.5    0.3     0.     0.1
0.1    0.1    0.1    0.2
220.  *     1.     1.     1.     1.     1.     1.     1.     1.     0.9    0.9    0.8    0.7    0.6    0.4     0.     0.1
0.1    0.2    0.2    0.2
230.  *     1.     1.     1.     1.     1.     1.     0.9    0.9    0.9    0.8    0.7    0.6    0.5    0.4     0.2    0.2
0.2    0.2    0.3    0.3
240.  *     1.     1.     1.     1.     1.     0.9    0.9    0.9    0.8    0.7    0.7    0.6    0.5    0.4     0.4    0.5
0.5    0.5    0.6    0.7
250.  *    0.9    0.9    0.9    0.9    0.7    0.7    0.7    0.7    0.6    0.6    0.6    0.5    0.4    0.3     0.9    0.9
1.     1.    1.2    1.2
260.  *    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.2    0.1     1.2    1.3
1.4    1.5    1.5    1.6
270.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1     0.     1.3    1.4
1.4    1.5    1.6    1.7
280.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.      0.     1.1    1.2
1.3    1.4    1.5    1.5
290.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.      0.     1.     1.1
1.3    1.3    1.3    1.4
300.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.      0.     0.     1.     1.
1.1    1.1    1.2    1.2
310.  *    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.      0.     0.9    1.
1.    1.1    1.2    1.2
320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.      0.     0.9    1.
1.1    1.1    1.1    1.1
330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.      0.     1.     1.1
1.1    1.1    1.1    1.1
340.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.      0.     1.     1.1
1.1    1.1    1.1    1.1
```

```
 350.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.1    1.1
 1.1    1.1    1.1    1.1
 360.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.1    1.1
 1.1    1.1    1.1    1.1

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *     1.     1.     1.    1.1    1.1    1.1    1.1    1.1     1.     1.    1.1    1.1     1.     1.     1.9    1.9
 1.9    1.9    1.9     2.
 DEGR. *     80     80     80     80     90     80     80     80     80     80     80     80     80     90     70     70
 70     70     60     70
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

```
WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
REC77  REC78  REC79  REC80

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *    1.1    1.1    1.1    1.1    1.1    1.2    1.2    1.2    1.2     1.    1.1    0.9    0.9    0.9     1.     1.
   1.    1.1    1.1     1.
 10.  *    1.1    1.1    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.1     1.    1.1    0.7     1.     1.     1.
 1.1    1.1     1.     1.
 20.  *    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.1    1.2     1.    0.6    0.5     1.     1.    1.1
 1.1    1.1     1.     1.
 30.  *    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.2    1.2    1.1    0.8    0.7    0.5     1.    1.2    1.2
 1.2    1.1    1.1    1.1
 40.  *    1.4    1.4    1.4    1.4    1.4    1.3    1.4    1.4    1.3    1.1     1.    0.8    0.8    1.1    1.1    1.2
 1.2    1.2    1.1    1.1
```

```
 50. *    1.7    1.6    1.6    1.5    1.5    1.6    1.7    1.7    1.6    1.3    1.    0.8    0.9    1.    1.1    1.1
 1.2    1.1    1.1    1.
 60. *     2.    1.9     2.    2.2    2.2    1.9    1.9    1.8    1.5    1.2    0.9    1.    1.1    0.8    0.9    1.
 1.3    1.1    1.1    1.
 70. *    2.1    1.9    1.9    1.9    1.9    1.7    1.6    1.6    1.6    1.1    1.    0.9    0.7    0.5    0.7    0.8
 1.    0.9    0.9    0.9
 80. *    1.4    1.2    1.3    1.3    1.3    1.2    1.2    1.    0.9    0.7    0.5    0.5    0.4    0.2    0.3    0.4
 0.6    0.5    0.5    0.5
 90. *    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.6    0.3    0.2    0.2    0.2    0.    0.1    0.2
 0.3    0.2    0.2    0.2
100. *    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.4    0.3    0.4    0.4    0.4    0.4    0.    0.    0.1
0.2    0.1    0.1    0.1
110. *    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.5    0.4    0.3    0.3    0.3    0.3    0.    0.    0.1
0.1    0.1    0.1    0.1
120. *    0.2    0.1    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.    0.    0.
0.1    0.1    0.1    0.1
130. *    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.1    0.1    0.2    0.3    0.3    0.    0.    0.
0.1    0.1    0.1     0.
140. *     0.     0.     0.     0.    0.1     0.     0.     0.    0.1    0.1    0.1    0.1    0.1    0.    0.    0.
0.     0.     0.     0.
150. *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.    0.    0.
0.     0.     0.     0.
160. *     0.     0.     0.     0.    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.    0.
0.1     0.     0.     0.
170. *     0.     0.     0.     0.    0.1     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.    0.
0.     0.     0.     0.
180. *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.2    0.2    0.1
0.1     0.     0.     0.
190. *     0.     0.     0.     0.    0.1     0.     0.     0.     0.     0.     0.     0.     0.    0.4    0.3    0.3
0.3    0.2    0.1    0.1
200. *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.    0.3    0.3    0.3
0.4    0.3    0.3    0.3
210. *    0.2    0.1    0.2    0.2    0.2    0.2    0.2    0.1    0.1     0.     0.     0.     0.    0.4    0.3    0.4
0.4    0.4    0.4    0.3
220. *    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1     0.     0.     0.    0.3    0.3    0.4
0.3    0.4    0.4    0.4
230. *    0.4    0.3    0.3    0.4    0.4    0.3    0.4    0.3    0.2    0.1     0.     0.     0.    0.3    0.3    0.3
0.4    0.3    0.3    0.3
240. *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.4    0.2    0.1    0.1    0.3    0.4    0.6
0.7    0.7    0.6    0.5
```

```
 250.  *    1.3    1.2    1.2    1.4    1.4    1.3    1.4    1.3    1.2    0.9    0.6    0.4    0.3    0.6    0.7    0.9
 1.    0.8    0.9    0.9
 260.  *    1.7    1.7    1.7    1.8    1.9    1.8    1.9    1.9    1.7    1.4    1.1    0.9    0.7     1.    0.9    1.1
 1.1     1.     1.    1.1
 270.  *    1.8    1.8    1.8    1.8    1.8    1.8    1.8    1.8    1.7    1.5    1.2    1.1    0.9    0.8     1.    1.1
 1.     1.    1.3    1.3
 280.  *    1.5    1.5    1.7    1.7    1.7    1.7    1.7    1.7    1.6    1.5    1.2    1.1    0.9    0.8    0.8    0.6
 1.1     1.    1.1    1.3
 290.  *    1.4    1.4    1.4    1.4    1.5    1.4    1.4    1.4    1.4    1.3    1.2     1.    0.9    0.5    0.5    0.9
 1.    1.1    1.2    1.2
 300.  *    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.1     1.    0.9    0.8    0.6     1.     1.
 1.2    1.2    1.2    1.2
 310.  *    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.1    1.1    0.9    0.8    0.9     1.     1.    1.2
 1.3    1.2    1.2    1.2
 320.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.9    0.8    0.8     1.    0.9    1.2
 1.1    1.2    1.1    1.1
 330.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.9    0.8    0.8    0.9    1.1     1.
 1.     1.     1.    1.1
 340.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.8     1.    0.8     1.     1.     1.
 1.     1.     1.    1.1
 350.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.2    1.1    0.9    0.9    0.8    0.9     1.     1.
 1.     1.     1.     1.
 360.  *    1.1    1.1    1.1    1.1    1.1    1.2    1.2    1.2    1.2     1.    1.1    0.9    0.9    0.9     1.     1.
 1.    1.1    1.1     1.

 ------*-----------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *    2.1    1.9     2.    2.2    2.2    1.9    1.9    1.9    1.7    1.5    1.2    1.1    1.1    1.1    1.2    1.2
 1.3    1.2    1.3    1.3
 DEGR. *     70     60     60     60     60     60     60    260    260    270    270     10     60     40     30     30
 60     40    270    270
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88	REC89	REC90	REC91	REC92	REC93	REC94	REC95	REC96	REC97	REC98	REC99	REC100
.	*	1.	1.	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.6	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.
10.	*	1.	0.9	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.5	0.2	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1
20.	*	1.	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.4	0.2	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
30.	*	1.	0.9	0.9	0.9	0.9	0.9	0.8	0.9	0.7	0.5	0.3	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
40.	*	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.9	0.7	0.4	0.3	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
50.	*	1.	1.	1.	0.9	0.8	0.9	0.8	0.8	0.6	0.4	0.3	0.	0.	0.1	0.2	0.2	0.2	0.2	0.2	0.2
60.	*	1.	1.	1.	0.9	0.9	0.8	0.7	0.7	0.6	0.4	0.4	0.1	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.5
70.	*	0.7	0.7	0.7	0.7	0.6	0.7	0.6	0.6	0.5	0.3	0.3	0.2	0.3	0.4	0.5	0.6	0.6	0.6	0.7	0.8
80.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.5	0.4	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.7	0.8	0.9	1.1
90.	*	0.2	0.1	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.	0.	0.3	0.4	0.6	0.6	0.7	0.8	0.9	0.9	1.2
100.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.	0.	0.3	0.5	0.6	0.7	0.8	0.9	1.	1.	1.2
110.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.2	0.4	0.5	0.7	0.8	0.8	0.9	0.9	1.2
120.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.2	0.4	0.5	0.6	0.7	0.8	0.8	0.8	1.1
130.	*	0.	0.	0.1	0.	0.	0.	0.	0.1	0.1	0.	0.	0.2	0.5	0.6	0.7	0.7	0.8	0.8	0.8	1.2
140.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.	0.	0.2	0.5	0.6	0.7	0.8	0.8	0.8	0.8	1.2

```
150.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.2    0.5    0.7    0.8    0.8
0.8    0.8    0.8    1.2
160.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.3    0.6    0.7    0.8    0.8
0.8    0.8    0.8    1.3
170.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.3    0.6    0.8    0.8    0.8
0.8    0.8    0.9    1.2
180.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.5    0.7    0.8    0.8    0.8
0.8    0.8     1.    1.2
190.  *     0.     0.    0.1     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.6    0.8    0.8    0.8    0.8
0.8    0.8    1.1    1.3
200.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.7    0.9    0.8    0.8    0.8
0.8    0.9    1.2    1.3
210.  *    0.3    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.8    0.9    0.9    0.9    0.9
1.    1.1    1.3    1.5
220.  *    0.4    0.3    0.2    0.2    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.1    0.9    1.1    1.1     1.    1.1
1.1    1.3    1.5    1.5
230.  *    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.4    0.4    0.3    0.2    1.2    1.2    1.1    1.1    1.2
1.3    1.4    1.7    1.8
240.  *    0.4    0.4    0.5    0.5    0.5    0.5    0.5    0.7    0.7    0.7    0.5    1.3    1.4    1.4    1.3    1.4
1.5    1.8    2.1    2.1
250.  *    0.9    0.9     1.    1.1    1.1     1.    1.1    1.2    1.1    1.1     1.    1.3    1.2    1.1    1.2    1.5
1.6    1.7    1.9     2.
260.  *    1.2    1.4    1.5    1.5    1.3    1.4    1.3    1.5    1.4    1.5    1.4    0.8    0.8    0.9    0.9    0.9
1.     1.     1.    1.2
270.  *    1.3    1.3    1.4    1.4    1.4    1.3    1.3    1.4    1.4    1.4    1.3    0.3    0.3    0.4    0.4    0.4
0.4    0.4    0.5    0.5
280.  *    1.2    1.2    1.2    1.2    1.1    1.4    1.2    1.3    1.3    1.2    1.1    0.1    0.2    0.2    0.2    0.2
0.2    0.2    0.3    0.3
290.  *    1.2    1.2    1.3    1.2    1.2    1.2    1.2    1.1    1.1    1.1    0.9    0.1    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.2
300.  *    1.2    1.2     1.     1.     1.     1.     1.     1.    0.9     1.    0.8    0.1    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
310.  *    1.2     1.     1.     1.     1.    0.9    0.9    0.8    0.9    0.9    0.7     0.    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
320.  *    1.1     1.     1.     1.     1.    0.9    0.8    0.7    0.8    0.9    0.5     0.     0.    0.1     0.     0.
0.    0.1    0.1    0.1
330.  *     1.     1.    0.9     1.    0.9    0.8    0.8    0.7    0.7    0.7    0.4     0.    0.1     0.     0.     0.
0.     0.     0.     0.
340.  *     1.     1.     1.     1.    0.9    0.8    0.8    0.7    0.7    0.7    0.4     0.     0.     0.     0.     0.
0.    0.1    0.1    0.1
```

```
 350.  *     1.     1.     1.    0.9    0.8    0.8    0.8    0.7    0.7    0.7    0.3     0.     0.     0.     0.     0.
 0.     0.    0.1    0.1
 360.  *     1.     1.    0.9    0.8    0.8    0.8    0.8    0.7    0.7    0.6    0.3     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.3    1.4    1.5    1.5    1.4    1.4    1.3    1.5    1.4    1.5    1.4    1.3    1.4    1.4    1.3    1.5
 1.6    1.8    2.1    2.1
 DEGR. *    270    260    260    260    270    260    260    260    260    260    260    240    240    240    240    250
 250    240    240    240
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC101 REC102 REC103 REC104 REC105 REC106 REC107 REC108 REC109 REC110 REC111 REC112 REC113 REC114 REC115 REC116
 REC117 REC118 REC119 REC120

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.    0.1     0.    0.6    0.6    0.6    0.5    0.4
   0.6    0.6    0.5    0.6
  10.  *    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.    0.5    0.5    0.4    0.4    0.5
  0.5    0.7    0.7     1.
  20.  *    0.1    0.1    0.1    0.1    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.5    0.5    0.5    0.6    0.6
  0.9    0.9    0.9    1.1
  30.  *    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.7    0.8    0.7    0.6    0.8
  0.9    0.9     1.    1.1
  40.  *    0.2    0.2    0.2    0.2    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.8    0.9    0.9    0.7    0.8
  0.8     1.     1.     1.
```

```
 50.  *    0.3    0.3    0.3    0.3    0.5    0.3    0.3    0.3    0.3    0.3    0.3    0.9    0.9    0.8    0.7    0.8
 0.9    0.9    0.9    0.9
 60.  *    0.6    0.7    0.7    0.8    0.8    0.7    0.6    0.7    0.7    0.7    0.7    1.1     1.    0.6    0.6    0.6
 0.7    0.8    0.8    0.8
 70.  *     1.     1.    1.2    1.4    1.4    1.2    1.2    1.2    1.2    1.3    1.4    0.6    0.4    0.4    0.5    0.6
 0.6    0.7    0.7    0.8
 80.  *    1.3    1.5    1.6    1.6    1.7    1.6    1.6    1.6    1.7    1.8    1.8    0.4    0.4    0.2    0.4    0.4
 0.5    0.6    0.6    0.7
 90.  *    1.4    1.6    1.7    1.8    1.8    1.8    1.8    1.9    1.9    1.9    1.9    0.3    0.3    0.4    0.4    0.4
 0.4    0.6    0.6    0.7
100.  *    1.6    1.7    1.7    1.8    1.8    1.6    1.7    1.7    1.7    1.8    1.8    0.3    0.3    0.4    0.4    0.5
0.5    0.6    0.6    0.7
110.  *    1.4    1.5    1.5    1.5    1.6    1.6    1.6    1.6    1.6    1.5    1.5    0.3    0.4    0.4    0.4    0.5
0.6    0.6    0.6    0.7
120.  *    1.3    1.3    1.3    1.3    1.4    1.4    1.4    1.4    1.4    1.4    1.3    0.4    0.4    0.4    0.5    0.6
0.7    0.7    0.8    0.7
130.  *    1.3    1.3    1.3    1.3    1.4    1.3    1.3    1.3    1.3    1.3    1.3    0.4    0.4    0.5    0.5    0.6
0.7    0.6    0.6    0.7
140.  *    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.1    0.2    0.3    0.3    0.4    0.5
0.5    0.5    0.5    0.7
150.  *    1.2    1.1    1.1    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    0.1    0.1    0.2    0.2    0.3
0.4    0.4    0.4    0.5
160.  *    1.3    1.3    1.1    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.1     0.    0.1    0.1    0.1    0.2
0.3    0.3    0.3    0.5
170.  *    1.2    1.1    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.6    1.3     0.    0.     0.     0.    0.1
0.1    0.2    0.2    0.3
180.  *    1.2    1.2    1.3    1.2    1.2    1.2    1.4    1.5    1.6    1.4    1.1     0.    0.     0.     0.     0.
0.    0.1    0.1    0.2
190.  *    1.2    1.2    1.3    1.3    1.6    1.5    1.5    1.6    1.4    1.3    0.9     0.    0.     0.     0.     0.
0.     0.     0.    0.1
200.  *    1.3    1.4    1.6    1.7    1.6    1.5    1.5    1.5    1.5    1.3    0.7     0.    0.     0.     0.     0.
0.     0.     0.    0.1
210.  *    1.6    1.7    1.8    1.6    1.6    1.5    1.5    1.4    1.2    1.1    0.8     0.    0.     0.     0.     0.
0.     0.     0.    0.1
220.  *    1.6    1.5    1.5    1.6    1.5    1.5    1.4    1.5    1.3    1.1    0.9     0.    0.     0.     0.     0.
0.     0.     0.     0.
230.  *    1.9    1.9    1.8    1.8    1.8    1.7    1.6    1.4    1.2    1.3     1.     0.    0.     0.     0.     0.
0.     0.     0.     0.
240.  *    2.2    2.2    2.2    2.2     2.    1.9    1.6    1.5    1.4    1.3    1.1     0.    0.     0.     0.     0.
0.     0.     0.     0.
```

```
 250.  *     2.     2.    1.8    1.8    1.8    1.4    1.3    1.3    1.3    1.2     1.    0.3    0.3    0.1    0.1    0.1
 0.1     0.     0.     0.
 260.  *    1.2    1.2    1.3    1.2    1.2     1.    0.8    0.8    0.6    0.8    0.6    0.6    0.4    0.4    0.4    0.3
 0.2    0.1    0.1    0.1
 270.  *    0.5    0.5    0.5    0.6    0.6    0.3    0.3    0.4    0.5    0.4    0.5    0.9    0.7    0.7    0.5    0.4
 0.4    0.3    0.3    0.2
 280.  *    0.3    0.3    0.4    0.4    0.4    0.3    0.3    0.4    0.4    0.4    0.5    0.9    0.7    0.7    0.6    0.6
 0.5    0.4    0.3    0.3
 290.  *    0.2    0.3    0.3    0.3    0.4    0.3    0.3    0.3    0.4    0.3    0.5    0.8    0.7    0.6    0.6    0.6
 0.4    0.4    0.4    0.5
 300.  *    0.1    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.7    0.6    0.6    0.6    0.5
 0.4    0.4    0.4    0.5
 310.  *    0.1    0.1    0.1    0.2    0.2    0.2    0.3    0.3    0.3    0.2    0.3    0.7    0.7    0.7    0.4    0.4
 0.4    0.4    0.4    0.4
 320.  *    0.1    0.1    0.1    0.1    0.1     0.    0.1    0.1    0.2    0.2    0.2    0.7    0.7    0.5    0.5    0.4
 0.3    0.3    0.4    0.5
 330.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.    0.1    0.2    0.7    0.5    0.5    0.5    0.5
 0.3    0.4    0.4    0.4
 340.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.7    0.6    0.5    0.4    0.3
 0.4    0.5    0.4    0.6
 350.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.6    0.7    0.6    0.6    0.5
 0.6    0.6    0.6    0.7
 360.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.    0.1     0.    0.6    0.6    0.6    0.5    0.4
 0.6    0.6    0.5    0.6

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    2.2    2.2    2.2    2.2     2.    1.9    1.8    1.9    1.9    1.9    1.9    1.1     1.    0.9    0.7    0.8
 0.9     1.     1.    1.1
 DEGR. *    240    240    240    240    240    240     90     90     90     90     90     60     60     40     40     30
 20     40     30     20
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC121	REC122	REC123	REC124	REC125	REC126	REC127	REC128	REC129	REC130	REC131	REC132	REC133	REC134	REC135	REC136	REC137	REC138	REC139	REC140
.	*	0.6	0.8	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9	1.	1.	1.1
10.	*	1.1	1.1	1.1	1.2	1.1	1.2	1.2	1.2	1.	0.2	0.4	0.4	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8
20.	*	1.1	1.2	1.2	1.1	1.3	1.3	1.1	0.9	0.8	0.1	0.3	0.3	0.3	0.3	0.5	0.5	0.6	0.6	0.6	0.7
30.	*	1.2	1.2	1.	1.	1.	1.	0.8	0.8	0.6	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.6	0.6	0.7
40.	*	1.	1.	0.9	0.8	0.8	0.7	0.7	0.6	0.5	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.4	0.4	0.4
50.	*	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.5	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3
60.	*	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.5	0.2	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
70.	*	0.7	0.7	0.6	0.6	0.6	0.6	0.4	0.4	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2
80.	*	0.7	0.6	0.6	0.6	0.6	0.5	0.4	0.3	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1
90.	*	0.7	0.6	0.6	0.6	0.6	0.4	0.4	0.3	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1
100.	*	0.6	0.6	0.6	0.6	0.4	0.4	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1
110.	*	0.6	0.6	0.6	0.6	0.4	0.4	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.2
120.	*	0.7	0.7	0.6	0.5	0.4	0.4	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.	0.1	0.1	0.2	0.2	0.3
130.	*	0.6	0.6	0.5	0.4	0.4	0.4	0.3	0.2	0.	0.	0.	0.	0.	0.	0.2	0.2	0.2	0.3	0.3	0.3
140.	*	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.2	0.	0.	0.	0.	0.1	0.2	0.2	0.4	0.4	0.5	0.5	0.6

```
150.  *    0.5    0.5    0.4    0.4    0.4    0.3    0.2    0.2    0.     0.     0.     0.2    0.2    0.3    0.4    0.5
0.6    0.7    0.7     1.
160.  *    0.4    0.4    0.4    0.3    0.3    0.3    0.2    0.1    0.     0.     0.1    0.2    0.2    0.4    0.6    0.7
0.9     1.    1.1    1.4
170.  *    0.3    0.3    0.3    0.2    0.2    0.2    0.1    0.1    0.     0.     0.1    0.2    0.2    0.5    0.8    0.9
1.2    1.3    1.4    1.6
180.  *    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.     0.     0.     0.1    0.2    0.4    0.7    0.8    0.9
0.9    1.4    1.6    1.7
190.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.     0.     0.1    0.3    0.4    0.7    0.9    0.9
1.    1.2    1.3    1.3
200.  *    0.1    0.1    0.1    0.1    0.     0.     0.     0.     0.     0.     0.1    0.3    0.4    0.8    0.9    0.9
0.9    1.2    1.1    1.2
210.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.3    0.6    0.8    0.8    0.8
0.9    1.1    1.1     1.
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.4    0.6    0.8    0.8    0.8
0.9     1.     1.     1.
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.4    0.6    0.7    0.7    0.7
0.9     1.     1.     1.
240.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.3    0.4    0.7    0.7    0.7    0.7
0.9     1.     1.     1.
250.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.4    0.4    0.7    0.8    0.7    0.7
1.     1.     1.     1.
260.  *    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.3    0.4    0.4    0.7    0.7    0.8    0.8
1.1    1.1    1.1    1.1
270.  *    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.4    0.5    0.5    0.8    0.8    0.8    0.8
1.2    1.2    1.3    1.3
280.  *    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.4    0.5    0.5    0.9    0.8     1.    1.2
1.3    1.3    1.4    1.4
290.  *    0.5    0.3    0.3    0.2    0.2    0.1    0.1    0.1    0.1    0.4    0.5    0.7     1.     1.    1.1    1.3
1.5    1.5    1.4    1.4
300.  *    0.5    0.5    0.4    0.4    0.3    0.3    0.2    0.2    0.1    0.6    0.6    0.7    1.1    1.1    1.3    1.3
1.5    1.5    1.5    1.4
310.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.6    0.7    0.9    1.2    1.3    1.3    1.5
1.6    1.5    1.4    1.5
320.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.3    0.3    0.3    0.7     1.    1.2    1.4    1.3    1.3    1.3
1.4    1.4    1.4    1.3
330.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.8    0.9     1.    1.3    1.4    1.7    1.8
1.8    1.6    1.7    1.5
340.  *    0.6    0.6    0.6    0.5    0.6    0.6    0.6    0.5    0.5    0.7    0.9     1.    1.1    1.2    1.4    1.6
1.5    1.4    1.4    1.4
```

```
 350.  *    0.7    0.8    0.7    0.7    0.7    0.7    0.7    0.8    0.8    0.4    0.5    0.6    0.6    0.7    0.7     1.
 0.9    1.1    1.2    1.3
 360.  *    0.6    0.8    0.7    0.8    0.8    0.8    0.9    0.9    0.9    0.6    0.6    0.6    0.7    0.7    0.7    0.8
 0.9     1.     1.    1.1

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.2    1.2    1.2    1.2    1.3    1.3    1.2    1.2     1.    0.8     1.    1.2    1.4    1.4    1.7    1.8
 1.8    1.6    1.7    1.7
 DEGR. *     30     20     20     10     20     20     10     10     10    330    320    320    320    330    330    330
 330    330    330    180
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC141	REC142	REC143	REC144	REC145	REC146
.	0.8	0.6	0.6	0.7	0.6	1.
10.	0.6	0.5	0.5	0.5	0.7	1.
20.	0.5	0.5	0.6	0.6	0.9	1.
30.	0.5	0.5	0.5	0.6	0.9	1.
40.	0.5	0.5	0.5	0.6	0.8	0.8
50.	0.3	0.4	0.4	0.6	0.7	0.9
60.	0.2	0.2	0.2	0.4	0.5	0.6
70.	0.1	0.1	0.1	0.2	0.2	0.3
80.	0.	0.	0.	0.	0.1	0.2
90.	0.	0.	0.	0.	0.	0.
100.	0.	0.	0.	0.	0.	0.
110.	0.	0.	0.	0.	0.	0.
120.	0.	0.	0.	0.	0.	0.

130.	*	0.2	0.	0.	0.	0.	0.
140.	*	0.2	0.1	0.	0.	0.	0.
150.	*	0.5	0.2	0.2	0.	0.	0.
160.	*	0.9	0.7	0.5	0.2	0.1	0.
170.	*	1.2	0.9	0.8	0.6	0.4	0.1
180.	*	1.4	1.2	0.9	0.8	0.6	0.4
190.	*	1.2	1.1	0.9	0.8	0.8	0.6
200.	*	1.2	1.1	0.9	0.8	0.8	0.5
210.	*	1.1	1.	0.9	0.8	0.6	0.5
220.	*	1.1	0.9	0.8	0.7	0.6	0.3
230.	*	1.	0.9	0.8	0.6	0.4	0.3
240.	*	1.	0.9	0.7	0.5	0.4	0.3
250.	*	1.1	0.9	0.8	0.6	0.6	0.5
260.	*	1.2	1.1	1.	0.8	0.8	0.9
270.	*	1.4	1.3	1.	0.9	1.	1.
280.	*	1.3	1.2	0.9	0.9	0.8	0.7
290.	*	1.4	1.2	0.8	1.	0.7	0.6
300.	*	1.4	1.1	0.9	0.8	0.5	0.5
310.	*	1.2	0.8	0.8	0.5	0.6	0.5
320.	*	1.3	1.1	0.7	0.5	0.6	0.8
330.	*	1.1	0.9	0.6	0.5	0.6	0.8
340.	*	1.	0.7	0.4	0.6	0.5	0.7
350.	*	0.9	0.5	0.5	0.5	0.6	0.9
360.	*	0.8	0.6	0.6	0.7	0.6	1.
------	*	----------					
MAX	*	1.4	1.3	1.	1.	1.	1.
DEGR.	*	180	270	260	290	270	0

THE HIGHEST CONCENTRATION OF 2.20 ppm OCCURRED AT RECEPTOR REC64.

FF

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*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/6/2012 12:23:15 AM
** File: F:\2975 FirstLight\Microscale\Worst\34 Dean Longmeadow & Owen LOS&ADT\2022NBSA.ou2
**
*********************************************
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 NB Sat RUN: CAL3QHC RUN

DATE : 12/ 6/12
TIME : 0:23:14

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE
VPH EF H W V/C QUEUE	*	X1	Y1	X2	Y2	*	(M)		
	*	(DEG)	(G/MI)	(M)	(M)	(VEH)			
1. Dean EB LL	*	235106.84	850497.38	235156.62	850512.50	*	52.	73.	AG
14. 8.5 0.0 9.0									
2. Dean EB LL QUEUE	*	235156.62	850512.50	235150.05	850510.50	*	7.	253.	AG
116. 100.0 0.0 3.0 0.93 1.1									
3. Dean EB TR	*	235066.06	850482.19	235155.91	850506.75	*	93.	75.	AG

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 945.   8.5   0.0   13.4
 4. Dean EB TR QUEUE                  *  235155.91    850506.75   235062.28    850481.12 *      97.   255. AG
 172. 100.0   0.0    7.4 1.00  16.2
 5. Dean WB LL                        *  235225.55    850536.69   235185.14    850524.44 *      42.   253. AG
 285.   8.5   0.0    9.4
 6. Dean WB LL QUEUE                  *  235185.14    850524.44   235394.23    850587.81 *     218.    73. AG
 102. 100.0   0.0    3.4 1.20  36.4
 7. Dean WB TR                        *  235275.70    850557.25   235185.14    850530.19 *      95.   253. AG
 967.   8.5   0.0   13.4
 8. Dean WB TR QUEUE                  *  235185.14    850530.19   235233.73    850544.69 *      51.    73. AG
 129. 100.0   0.0    7.4 0.60   8.5
 9. Owen NB LL                        *  235207.16    850428.06   235179.00    850508.50 *      85.   341. AG
 56.   8.5   0.0    9.7
10. Owen NB LL QUEUE                  *  235179.00    850508.50   235181.78    850500.56 *       8.   161. AG
92. 100.0   0.0    3.7 0.15   1.4
11. Owen NB T                         *  235208.59    850429.88   235181.17    850508.88 *      84.   341. AG
249.   8.5   0.0    9.7
12. Owen NB T QUEUE                   *  235181.17    850508.88   235193.42    850473.56 *      37.   161. AG
92. 100.0   0.0    3.7 0.66   6.2
13. Owen NB R                         *  235207.52    850436.38   235189.47    850493.75 *      60.   343. AG
358.   8.5   0.0    9.7
14. Owen NB R QUEUE                   *  235189.47    850493.75   235210.80    850425.94 *      71.   163. AG
92. 100.0   0.0    3.7 0.94  11.8
15. Longmeadow SB L                   *  235147.36    850577.25   235162.05    850535.25 *      44.   161. AG
218.   8.5   0.0    9.0
16. Longmeadow SB L QUEUE             *  235162.05    850535.25   235151.41    850566.19 *      33.   341. AG
92. 100.0   0.0    3.0 0.58   5.4
17. Longmeadow SB TR                  *  235134.16    850612.38   235159.88    850533.06 *      83.   162. AG
286.   8.5   0.0    9.0
18. Longmeadow SB TR QUEUE            *  235159.88    850533.06   235146.06    850575.44 *      45.   342. AG
92. 100.0   0.0    3.0 0.75   7.4
19. Dean EB OUTBOUND                  *  235195.64    850518.06   235273.02    850547.94 *      83.    69. AG
1437.   8.5   0.0   13.4
20. Dean WB OUTBOUND                  *  235156.41    850522.00   235064.98    850493.25 *      96.   253. AG
818.   8.5   0.0   13.4
21. Longmeadow NB OUTBOUND            *  235170.09    850535.00   235137.33    850611.62 *      83.   337. AG
493.   8.5   0.0    9.0
22. Owen SB OUTBOUND                  *  235175.48    850492.88   235201.41    850426.62 *      71.   159. AG
630.   8.5   0.0    9.7
23. EBL                               *  235157.16    850512.56   235169.77    850534.62 *      25.    30. AG
```

14. 9.4 0.0 9.0
24. EBT * 235156.48 850506.94 235194.47 850517.81 * 40. 74. AG
861. 8.5 0.0 12.0
25. EBR * 235146.28 850504.06 235174.59 850494.12 * 30. 109. AG
84. 10.3 0.0 9.0
26. WBL * 235183.81 850524.38 235172.95 850497.75 * 29. 202. AG
285. 9.4 0.0 9.0
27. WBT * 235184.27 850530.12 235156.48 850522.06 * 29. 254. AG
737. 8.5 0.0 12.0
28. WBR * 235184.27 850529.44 235168.45 850535.38 * 17. 291. AG
230. 10.3 0.0 9.0
29. NBL * 235178.67 850509.50 235156.05 850521.88 * 26. 299. AG
56. 9.4 0.0 9.0
30. NBT * 235180.75 850510.00 235170.09 850534.50 * 27. 336. AG
249. 8.5 0.0 9.0
31. NBR * 235188.33 850495.06 235198.97 850518.94 * 26. 24. AG
358. 10.3 0.0 9.0
32. SBL * 235162.09 850534.69 235188.55 850516.94 * 32. 124. AG
218. 9.4 0.0 9.0
33. SBT * 235159.89 850532.50 235173.73 850497.75 * 37. 158. AG
261. 8.5 0.0 9.0
34. SBR * 235160.44 850532.31 235155.61 850521.56 * 12. 204. AG
25. 10.3 0.0 9.0

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 NB Sat RUN: CAL3QHC
RUN

DATE : 12/ 6/12
TIME : 0:23:14

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Dean EB LL QUEUE	*	120	113	4.0	14	1900	45.89	3	3

4. Dean EB TR QUEUE	*	120	84	4.0	945	1900	45.89	3	3
6. Dean WB LL QUEUE	*	120	99	4.0	285	1900	45.89	3	3
8. Dean WB TR QUEUE	*	120	63	4.0	967	1900	45.89	3	3
10. Owen NB LL QUEUE	*	120	90	4.0	56	1900	45.89	3	3
12. Owen NB T QUEUE	*	120	90	4.0	249	1900	45.89	3	3
14. Owen NB R QUEUE	*	120	90	4.0	358	1900	45.89	3	3
16. Longmeadow SB L QUEUE	*	120	90	4.0	218	1900	45.89	3	3
18. Longmeadow SB TR QUEUE	*	120	90	4.0	286	1900	45.89	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235178.36	850537.06	1.8	*
2. LR_2	*	235171.39	850540.94	1.8	*
3. LR_3	*	235169.19	850544.88	1.8	*
4. LR_4	*	235166.98	850548.81	1.8	*
5. LR_5	*	235163.70	850553.81	1.8	*
6. LR_6	*	235161.97	850558.50	1.8	*
7. LR_7	*	235160.23	850563.19	1.8	*
8. LR_8	*	235158.48	850567.88	1.8	*
9. LR_9	*	235156.75	850572.56	1.8	*
10. LR_10	*	235155.02	850577.25	1.8	*
11. LR_11	*	235153.27	850581.94	1.8	*
12. LR_12	*	235151.53	850586.62	1.8	*
13. LR_13	*	235149.80	850591.31	1.8	*
14. LR_14	*	235148.05	850596.00	1.8	*
15. LR_15	*	235146.31	850600.69	1.8	*
16. LR_16	*	235144.56	850605.38	1.8	*
17. LR_17	*	235142.83	850610.06	1.8	*
18. LR_18	*	235130.50	850610.00	1.8	*
19. LR_19	*	235132.23	850605.31	1.8	*
20. LR_20	*	235133.98	850600.62	1.8	*
21. LR_21	*	235135.72	850595.94	1.8	*
22. LR_22	*	235137.45	850591.25	1.8	*
23. LR_23	*	235139.20	850586.56	1.8	*
24. LR_24	*	235140.94	850581.88	1.8	*
25. LR_25	*	235142.69	850577.19	1.8	*

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 NB Sat RUN: CAL3QHC
RUN

RECEPTOR	COORDINATES (M) X	Y	Z
26. LR_26	235144.42	850572.50	1.8
27. LR_27	235146.16	850567.81	1.8
28. LR_28	235147.91	850563.12	1.8
29. LR_29	235149.64	850558.44	1.8
30. LR_30	235151.38	850553.75	1.8
31. LR_31	235153.12	850549.06	1.8
32. LR_32	235154.86	850544.38	1.8
33. LR_33	235154.91	850539.38	1.8
34. LR_34	235156.66	850534.69	1.8
35. LR_35	235153.22	850528.19	1.8
36. LR_36	235149.31	850523.50	1.8
37. LR_37	235144.55	850522.06	1.8
38. LR_38	235139.75	850520.56	1.8
39. LR_39	235134.97	850519.12	1.8
40. LR_40	235130.19	850517.69	1.8
41. LR_41	235125.41	850516.25	1.8
42. LR_42	235120.62	850514.75	1.8
43. LR_43	235115.83	850513.31	1.8
44. LR_44	235111.05	850511.88	1.8
45. LR_45	235106.27	850510.38	1.8
46. LR_46	235101.48	850508.94	1.8
47. LR_47	235096.70	850507.50	1.8
48. LR_48	235091.92	850506.00	1.8
49. LR_49	235087.12	850504.56	1.8
50. LR_50	235082.34	850503.12	1.8
51. LR_51	235077.56	850501.69	1.8
52. LR_52	235072.78	850500.19	1.8
53. LR_53	235068.00	850498.75	1.8
54. LR_54	235063.20	850497.31	1.8
55. LR_55	235073.41	850479.50	1.8
56. LR_56	235078.19	850480.94	1.8
57. LR_57	235082.97	850482.38	1.8
58. LR_58	235087.75	850483.81	1.8
59. LR_59	235092.55	850485.31	1.8

60. LR_60	*	235097.31	850486.75	1.8 *
61. LR_61	*	235102.09	850488.19	1.8 *
62. LR_62	*	235107.00	850489.25	1.8 *
63. LR_63	*	235111.78	850490.69	1.8 *
64. LR_64	*	235116.56	850492.12	1.8 *
65. LR_65	*	235121.34	850493.56	1.8 *
66. LR_66	*	235126.88	850494.75	1.8 *
67. LR_67	*	235131.12	850496.00	1.8 *
68. LR_68	*	235135.80	850497.12	1.8 *
69. LR_69	*	235140.27	850497.81	1.8 *
70. LR_70	*	235145.27	850497.75	1.8 *
71. LR_71	*	235149.83	850496.81	1.8 *
72. LR_72	*	235153.11	850496.06	1.8 *
73. LR_73	*	235156.19	850495.12	1.8 *
74. LR_75	*	235202.16	850511.88	1.8 *
75. LR_76	*	235204.62	850514.00	1.8 *
76. LR_77	*	235207.84	850516.75	1.8 *
77. LR_79	*	235212.31	850520.25	1.8 *
78. LR_80	*	235217.08	850521.75	1.8 *

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 NB Sat RUN: CAL3QHC
RUN

RECEPTOR	*	X	Y	Z *
	*	COORDINATES (M)		*
79. LR_81	*	235221.84	850523.25	1.8 *
80. LR_82	*	235226.45	850524.75	1.8 *
81. LR_83	*	235231.23	850526.25	1.8 *
82. LR_84	*	235236.00	850527.75	1.8 *
83. LR_85	*	235240.45	850530.38	1.8 *
84. LR_86	*	235245.23	850531.88	1.8 *
85. LR_87	*	235249.98	850533.38	1.8 *
86. LR_88	*	235254.45	850535.50	1.8 *
87. LR_89	*	235259.22	850537.00	1.8 *
88. LR_90	*	235263.38	850541.00	1.8 *
89. LR_91	*	235268.14	850542.50	1.8 *
90. LR_92	*	235272.91	850544.00	1.8 *
91. LR_93	*	235277.69	850545.50	1.8 *
92. LR_94	*	235275.39	850561.56	1.8 *

93.	LR_95	*	235270.62	850560.06	1.8 *
94.	LR_96	*	235265.86	850558.56	1.8 *
95.	LR_97	*	235261.09	850557.00	1.8 *
96.	LR_98	*	235256.31	850555.50	1.8 *
97.	LR_99	*	235251.56	850554.00	1.8 *
98.	LR_100	*	235246.80	850552.50	1.8 *
99.	LR_101	*	235242.02	850551.00	1.8 *
**.	LR_102	*	235237.27	850549.50	1.8 *
**.	LR_103	*	235232.48	850548.00	1.8 *
**.	LR_104	*	235227.72	850546.50	1.8 *
**.	LR_105	*	235222.95	850545.00	1.8 *
**.	LR_106	*	235218.19	850543.44	1.8 *
**.	LR_107	*	235213.42	850541.94	1.8 *
**.	LR_108	*	235208.66	850541.38	1.8 *
**.	LR_109	*	235202.81	850539.88	1.8 *
**.	LR_110	*	235198.05	850538.38	1.8 *
**.	LR_111	*	235194.19	850537.31	1.8 *
**.	LR_112	*	235189.44	850535.81	1.8 *
**.	LR_113	*	235184.66	850534.31	1.8 *
**.	LR_114	*	235159.12	850493.88	1.8 *
**.	LR_115	*	235161.91	850492.31	1.8 *
**.	LR_116	*	235165.55	850490.00	1.8 *
**.	LR_117	*	235168.09	850487.94	1.8 *
**.	LR_118	*	235170.88	850485.00	1.8 *
**.	LR_119	*	235173.97	850481.00	1.8 *
**.	LR_120	*	235176.31	850476.75	1.8 *
**.	LR_121	*	235178.02	850473.00	1.8 *
**.	LR_122	*	235181.77	850468.19	1.8 *
**.	LR_123	*	235183.45	850463.50	1.8 *
**.	LR_124	*	235185.16	850458.81	1.8 *
**.	LR_125	*	235186.86	850454.12	1.8 *
**.	LR_126	*	235188.56	850449.38	1.8 *
**.	LR_127	*	235190.27	850444.69	1.8 *
**.	LR_128	*	235191.95	850440.00	1.8 *
**.	LR_129	*	235193.66	850435.31	1.8 *
**.	LR_130	*	235195.36	850430.56	1.8 *
**.	LR_131	*	235197.06	850425.88	1.8 *
**.	LR_132	*	235211.48	850433.06	1.8 *
**.	LR_133	*	235209.78	850437.75	1.8 *

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 NB Sat RUN: CAL3QHC
RUN

RECEPTOR	COORDINATES (M) X	Y	Z
**. LR_134	235208.08	850442.50	1.8
**. LR_135	235206.38	850447.19	1.8
**. LR_136	235204.69	850451.88	1.8
**. LR_137	235202.98	850456.56	1.8
**. LR_138	235201.28	850461.25	1.8
**. LR_139	235199.58	850466.00	1.8
**. LR_140	235197.88	850470.69	1.8
**. LR_141	235196.19	850475.38	1.8
**. LR_142	235194.48	850480.06	1.8
**. LR_143	235194.25	850485.06	1.8
**. LR_144	235194.02	850489.75	1.8
**. LR_145	235194.09	850494.19	1.8
**. LR_146	235194.45	850498.88	1.8
**. LR_147	235195.98	850503.62	1.8
**. LR_148	235199.00	850508.31	1.8

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.				

```
   0.     0.    0.1    0.1
 10.  *     0.     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 20.  *     0.     0.     0.     0.    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 30.  *     0.     0.     0.     0.    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 60.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 70.  *    0.4    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.2    0.2
 80.  *    0.9    0.5    0.4    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 90.  *    1.1    0.7    0.5    0.4    0.4    0.3    0.2    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
100.  *    1.2    0.9    0.7    0.6    0.4    0.4    0.4    0.3    0.3    0.2    0.1    0.1    0.1    0.1     0.     0.
0.    0.2    0.2    0.2
110.  *     1.    0.7    0.7    0.7    0.6    0.5    0.5    0.4    0.4    0.4    0.3    0.3    0.3    0.1    0.1    0.1
0.1    0.3    0.3    0.3
120.  *     1.    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.3
0.2    0.4    0.6    0.6
130.  *    0.8    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.3
0.2    0.5    0.6    0.6
140.  *    0.7    0.6    0.7    0.6    0.6    0.6    0.6    0.6    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.3
0.3    0.3    0.3    0.3
150.  *    0.6    0.6    0.6    0.4    0.4    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2
0.1    0.5    0.4    0.5
160.  *    0.6    0.8    0.7    0.6    0.6    0.6    0.6    0.6    0.5    0.4    0.5    0.5    0.5    0.5    0.5    0.4
0.3    0.3    0.4    0.4
170.  *    0.8    0.9    0.7    0.6    0.4    0.5    0.7    0.7    0.5    0.6    0.7    0.7    0.6    0.6    0.6    0.6
0.6    0.2    0.3    0.3

------*-------------------------------------------------------------------------------------------------------------
--------------------
MAX   *    1.2    0.9    0.7    0.7    0.6    0.6    0.7    0.7    0.5    0.6    0.7    0.7    0.6    0.6    0.6    0.6
0.6    0.5    0.6    0.6
```

DEGR. * 100 100 100 110 110 140 170 170 130 170 170 170 170 170 170 170
170 130 120 120

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
	* REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
REC17	REC18	REC19	REC20													
180.	* 0.8	0.6	0.4	0.4	0.5	0.6	0.7	0.8	0.8	0.9	0.8	0.8	0.7	0.6	0.5	0.5
0.5	0.1	0.1	0.1													
190.	* 0.5	0.6	0.4	0.6	0.6	0.9	1.1	1.1	1.1	1.1	1.	0.9	0.7	0.5	0.5	0.4
0.4	0.1	0.1	0.1													
200.	* 0.5	0.5	0.5	0.8	0.9	1.1	1.1	1.1	1.1	1.	0.9	0.7	0.7	0.6	0.5	0.4
0.4	0.1	0.1	0.1													
210.	* 0.6	0.6	0.7	0.7	1.1	1.1	1.	1.	0.9	1.	0.8	0.7	0.5	0.4	0.4	0.4
0.4	0.	0.	0.1													
220.	* 0.8	0.6	0.7	0.9	1.1	1.1	1.	1.	0.9	0.7	0.5	0.3	0.3	0.2	0.2	0.2
0.2	0.	0.	0.													
230.	* 0.8	0.5	0.7	0.9	1.	1.	0.9	0.9	0.7	0.5	0.3	0.2	0.2	0.2	0.2	0.2
0.2	0.	0.	0.													
240.	* 0.8	0.8	0.6	0.8	0.8	0.7	0.7	0.7	0.5	0.4	0.2	0.2	0.2	0.2	0.2	0.2
0.2	0.	0.	0.													
250.	* 0.6	0.5	0.7	0.5	0.7	0.7	0.7	0.6	0.5	0.3	0.2	0.2	0.2	0.2	0.2	0.2
0.2	0.	0.	0.													
260.	* 0.4	0.3	0.5	0.5	0.6	0.7	0.7	0.6	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2
0.2	0.	0.	0.													
270.	* 0.4	0.4	0.4	0.5	0.6	0.6	0.6	0.5	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2

```
0.2     0.     0.     0.
280.  *    0.3    0.6    0.6    0.6    0.7    0.7    0.6    0.4    0.3    0.2    0.3    0.3    0.3    0.3    0.3    0.2
0.1     0.     0.     0.
290.  *    0.3    0.6    0.6    0.7    0.7    0.7    0.6    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.2
0.1     0.     0.     0.
300.  *    0.3    0.7    0.7    0.8    0.8    0.7    0.6    0.5    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2
0.1     0.     0.     0.
310.  *    0.4    0.7    0.6    0.6    0.6    0.6    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.1
0.1     0.     0.     0.
320.  *    0.4    0.6    0.6    0.6    0.7    0.5    0.5    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.2    0.1
0.1     0.     0.     0.
330.  *    0.1    0.5    0.6    0.5    0.5    0.4    0.4    0.4    0.4    0.4    0.2    0.2    0.2    0.2    0.1    0.1
0.     0.     0.     0.
340.  *    0.1    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1
0.     0.     0.    0.1
350.  *     0.    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1     0.
0.     0.     0.    0.1
360.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.
0.     0.    0.1    0.1

------*-----------------------------------------------------------------------------------------------------------------------
---------------------
MAX   *    1.2    0.9    0.7    0.9    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.9    0.7    0.6    0.6    0.6
0.6    0.5    0.6    0.6
DEGR. *    100    100    100    220    210    200    190    190    190    190    190    190    180    170    170    170
170    130    120    120

      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
```

```
REC37  REC38  REC39  REC40

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *    0.2    0.2    0.2    0.2    0.2    0.3    0.7    0.8     1.    1.2    1.3    1.4     1.    1.2    0.5    0.4
  0.1     0.     0.     0.

------*-------------------------------------------------------------------------------------------------------------------
---------------------
MAX   *    0.2    0.2    0.2    0.2    0.2    0.3    0.7    0.8     1.    1.2    1.3    1.4     1.    1.2    0.5    0.4
0.1     0.     0.     0.
DEGR. *      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
0      0      0      0
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
REC37  REC38  REC39  REC40

------*-------------------------------------------------------------------------------------------------------------------
---------------------
 10.  *    0.2    0.2    0.2    0.2    0.2    0.3    0.7    0.8    0.9     1.    1.2    1.2     1.     1.    0.7    0.4
 0.4    0.1     0.     0.
 20.  *    0.2    0.2    0.2    0.2    0.2    0.3    0.7    0.7     1.    1.1    1.1    1.1     1.     1.    0.6    0.4
 0.3    0.4    0.2    0.1
 30.  *    0.2    0.2    0.2    0.2    0.2    0.4    0.7    0.7    0.9     1.     1.     1.    0.8    0.9    0.5    0.3
 0.4    0.4    0.3    0.3
 40.  *    0.2    0.2    0.2    0.2    0.2    0.4    0.6    0.8    0.9     1.     1.     1.    0.8    0.8    0.4    0.4
 0.4    0.3    0.3    0.3
```

50.	*	0.2	0.2	0.2	0.2	0.2	0.6	0.6	0.7	0.8	0.8	0.9	0.9	0.8	0.8	0.3	0.4
0.3	0.3	0.3	0.3														
60.	*	0.2	0.2	0.2	0.2	0.2	0.6	0.6	0.8	0.8	0.8	0.9	0.9	0.8	0.8	0.3	0.4
0.5	0.5	0.2	0.2														
70.	*	0.2	0.2	0.2	0.2	0.2	0.6	0.6	0.8	0.8	0.9	0.8	0.9	1.	1.	0.5	0.7
0.7	0.7	0.8	0.8														
80.	*	0.2	0.2	0.2	0.2	0.2	0.6	0.6	0.8	0.8	0.9	1.1	1.2	1.2	1.2	1.	0.9
0.9	0.8	0.8	0.8														
90.	*	0.2	0.2	0.2	0.2	0.3	0.7	0.7	1.	1.1	1.3	1.3	1.3	1.4	1.5	1.	0.9
0.8	0.9	0.9	0.9														
100.	*	0.3	0.3	0.3	0.3	0.5	0.9	1.	1.3	1.3	1.4	1.4	1.5	1.5	1.1	0.8	0.7
0.5	0.6	0.5	0.5														
110.	*	0.3	0.5	0.5	0.5	0.8	1.	1.2	1.4	1.4	1.4	1.4	1.4	1.2	1.	0.5	0.5
0.4	0.5	0.7	0.6														
120.	*	0.7	0.6	0.6	0.6	0.9	1.2	1.3	1.4	1.4	1.5	1.5	1.5	0.9	0.8	0.4	0.5
0.5	0.7	0.8	0.6														
130.	*	0.6	0.6	0.7	0.7	1.1	1.2	1.5	1.5	1.3	1.4	1.4	1.3	0.8	0.6	0.5	0.5
0.7	0.8	0.7	0.9														
140.	*	0.4	0.4	0.4	0.6	0.8	1.	1.1	1.2	1.4	1.4	1.3	1.3	0.9	0.7	0.6	0.7
0.8	0.8	0.8	0.7														
150.	*	0.5	0.5	0.7	0.8	1.	1.1	1.4	1.3	1.3	1.3	1.4	1.4	0.9	0.6	0.5	0.7
0.7	0.6	0.7	0.7														
160.	*	0.5	0.5	0.6	0.6	0.7	0.9	0.9	0.9	1.	1.	1.	1.2	0.6	0.4	0.5	0.6
0.6	0.7	0.7	0.7														
170.	*	0.3	0.3	0.3	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.8	0.7	0.5	0.3	0.6	0.6
0.7	0.7	0.7	0.7														
180.	*	0.2	0.2	0.2	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.3	0.5	0.6	0.7
0.7	0.7	0.7	0.7														
190.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.5	0.5	0.5	0.4	0.5	0.6	0.7
0.7	0.7	0.7	0.7														
200.	*	0.1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.5	0.4	0.5	0.6	0.7
0.7	0.7	0.7	0.7														
210.	*	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.8	0.8
0.8	0.8	0.8	0.8														
220.	*	0.	0.	0.	0.1	0.1	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.6	0.8	0.8
0.8	0.8	0.8	0.8														
230.	*	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.3	0.3	0.4	0.5	0.5	0.9	0.9
0.9	0.9	0.9	0.9														
240.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.3	0.5	0.7	0.9
0.8	0.8	0.7	0.7														

```
 250.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.5    0.7
 0.6    0.6    0.6    0.6
 260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.4
 0.4    0.4    0.4    0.3
 270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2
 0.2    0.2    0.2    0.2
 280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.2    0.     0.     0.     0.     0.
 0.1     0.     0.     0.
 320.  *     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.2    0.2    0.3    0.3    0.1    0.1    0.     0.1    0.
 0.     0.     0.     0.
 330.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.4    0.4    0.6    0.2    0.2    0.     0.1    0.
 0.     0.     0.     0.
 340.  *    0.1    0.1    0.1    0.1    0.1    0.2    0.4    0.5    0.7    0.9    1.1    1.1    0.8    0.8    0.1     0.     0.
 0.     0.     0.     0.
 350.  *    0.1    0.2    0.2    0.2    0.3    0.3    0.5    0.8    0.9    1.1    1.3    1.3     1.     1.    0.4    0.1    0.
 0.     0.     0.     0.
 360.  *    0.2    0.2    0.2    0.2    0.2    0.3    0.7    0.8     1.    1.2    1.3    1.4     1.    1.2    0.5    0.4    0.1
  0.     0.     0.     0.

 ------*-------------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *    0.7    0.6    0.7    0.8    1.1    1.2    1.5    1.5    1.4    1.5    1.5    1.5    1.5    1.5     1.    0.9    0.9
 0.9    0.9    0.9    0.9
 DEGR. *    120    120    130    150    130    120    130    130    110    120    120    100    100     90     80     80     80
 80     90     90     90
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.1	1.	1.	1.	1.	1.
10.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.1	1.1	1.1	1.1	1.1	1.
20.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.1	1.1	1.1	1.2	1.2	1.2
30.	*	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	1.2	1.2	1.2	1.2	1.2	1.2
40.	*	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.4	1.4	1.4	1.4	1.4	1.4
50.	*	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.5	1.5	1.5	1.5	1.5	1.6
60.	*	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	1.6	1.6	1.6	1.7	1.8	1.8
70.	*	0.8	0.8	0.7	0.7	0.8	0.8	0.8	0.7	0.6	0.5	0.6	0.6	0.6	0.6	1.7	1.7	1.7	1.7	1.9	1.9
80.	*	0.9	1.	1.	0.9	0.9	1.	1.	0.9	0.8	0.8	0.9	0.9	0.9	0.9	0.9	1.	1.	1.1	1.1	1.1
90.	*	0.6	0.8	0.9	0.9	0.9	0.9	0.8	0.7	0.8	0.9	0.9	0.9	0.9	0.9	0.4	0.4	0.5	0.6	0.6	0.6
100.	*	0.6	0.7	0.7	0.7	0.8	0.8	0.9	0.9	0.9	0.9	1.	1.	1.	0.9	0.2	0.2	0.2	0.2	0.2	0.3
110.	*	0.7	0.6	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.1	0.1	0.1	0.1	0.2	0.2
120.	*	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.7	0.1	0.1	0.1	0.1	0.1	0.2
130.	*	0.9	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.	0.	0.	0.	0.1	0.1
140.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.	0.	0.	0.	0.	0.

```
150.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6     0.     0.
0.     0.     0.     0.
160.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.5     0.     0.
0.     0.     0.     0.
170.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.4     0.     0.
0.     0.     0.     0.
180.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.2     0.     0.
0.     0.     0.     0.
190.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.5    0.1     0.     0.
0.     0.     0.     0.
200.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.5    0.3     0.     0.     0.
0.     0.    0.1    0.1
210.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.5    0.5    0.3     0.     0.    0.1
0.1    0.1    0.1    0.2
220.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.6    0.6    0.3    0.1     0.     0.    0.1
0.1    0.1    0.2    0.2
230.  *    0.9    0.9    0.9    0.9    0.8    0.8    0.6    0.6    0.6    0.5    0.3    0.2    0.1     0.    0.1    0.1
0.2    0.2    0.2    0.2
240.  *    0.7    0.7    0.7    0.7    0.7    0.6    0.6    0.5    0.4    0.3    0.2    0.2    0.1     0.    0.2    0.3
0.3    0.4    0.4    0.5
250.  *    0.6    0.6    0.6    0.5    0.5    0.5    0.3    0.3    0.3    0.3    0.2    0.2    0.1     0.    0.3    0.4
0.5    0.7    0.8    0.8
260.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.1     0.    0.5    0.6
0.9     1.    1.2    1.2
270.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1     0.     0.    0.6    0.8
1.    1.1    1.3    1.5
280.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.    0.7     1.
1.1    1.2    1.4    1.4
290.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.    0.8     1.
1.1    1.2    1.2    1.2
300.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.    0.8     1.
1.1    1.1    1.1    1.2
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.9     1.
1.     1.    1.2    1.2
320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.8     1.
1.     1.     1.     1.
330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.8    0.9
0.9    0.9    0.9    0.9
340.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.9    0.9
0.9    0.9    0.9    0.9
```

```
 350.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.9    0.9
 0.9    0.9    0.9    0.9
 360.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.1     1.
 1.     1.     1.     1.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.9     1.     1.    0.9    0.9     1.     1.    0.9    0.9    0.9     1.     1.     1.    0.9    1.7    1.7
 1.7    1.7    1.9    1.9
 DEGR. *     80     80     80     80     80     80     80     80    100     90    100    100    100     80     70     70
 70     60     70     70
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
 REC77  REC78  REC79  REC80

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9     1.    0.9    0.9    0.9    0.8    0.8     1.
   1.1    1.1     1.     1.
  10.  *     1.    1.1     1.     1.     1.    0.9    0.9     1.    1.1    1.1     1.     1.    0.5    0.8    0.9     1.
  1.1    1.1     1.     1.
  20.  *    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.3     1.    0.5    0.3    0.8    0.9    1.2
  1.1     1.     1.    0.9
  30.  *    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.1    1.2    1.2    0.8    0.5    0.3     1.    1.1    1.1
  1.1    1.1     1.     1.
  40.  *    1.4    1.4    1.4    1.4    1.2    1.3    1.2    1.3    1.3    1.1    0.8    0.6    0.6     1.    1.1    1.1
  1.1    1.1    1.1     1.
```

```
 50.  *    1.6    1.4    1.4    1.4    1.4    1.5    1.6    1.7    1.6    1.1    0.9    0.6    0.6     1.    1.1    1.2
 1.2    1.1    1.1    1.1
 60.  *    1.9     2.    1.9     2.     2.    1.8    1.9    1.7    1.4    1.1    0.7    0.7    0.7    0.8    0.9     1.
 1.     1.     1.     1.
 70.  *     2.    1.9    1.8    1.8    1.8    1.7    1.6    1.4    1.4    0.9    0.8    0.6    0.6    0.4    0.5    0.8
 1.     1.    0.9    0.8
 80.  *    1.3    1.2    1.3    1.3    1.3    1.1    1.1     1.    0.7    0.5    0.4    0.3    0.2    0.1    0.3    0.4
 0.6    0.6    0.5    0.5
 90.  *    0.6    0.6    0.6    0.6    0.6    0.4    0.5    0.5    0.4    0.2    0.1    0.1    0.1    0.1    0.1    0.2
 0.3    0.3    0.2    0.2
100.  *    0.3    0.2    0.2    0.3    0.3    0.2    0.2    0.3    0.2    0.2    0.2    0.2    0.3     0.     0.    0.1
0.2    0.1    0.1    0.1
110.  *    0.2    0.2    0.2    0.2    0.3    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3     0.     0.    0.1
0.1    0.1    0.1    0.1
120.  *    0.2    0.1    0.2    0.2    0.2    0.3    0.4    0.3    0.3    0.2    0.2    0.2    0.3     0.     0.    0.1
0.1    0.1    0.1    0.1
130.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2     0.     0.    0.
0.1    0.1    0.1    0.1
140.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.2    0.2     0.     0.    0.
0.1     0.     0.     0.
150.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1     0.     0.    0.
0.     0.     0.     0.
160.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.      0.     0.    0.
0.1     0.     0.     0.
170.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.
0.     0.     0.     0.
180.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1
0.2     0.     0.     0.
190.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.4    0.3    0.1
0.2    0.2    0.2    0.1
200.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.4    0.3    0.4
0.3    0.2    0.2    0.2
210.  *    0.2    0.1    0.2    0.2    0.2    0.1    0.2    0.1    0.1     0.     0.     0.     0.     0.4    0.4    0.4
0.4    0.3    0.2    0.2
220.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.3    0.3    0.4
0.4    0.3    0.3    0.2
230.  *    0.3    0.2    0.3    0.3    0.4    0.3    0.3    0.3    0.2    0.1     0.     0.     0.     0.2    0.2    0.3
0.4    0.4    0.3    0.3
240.  *    0.6    0.5    0.6    0.6    0.7    0.6    0.6    0.6    0.4    0.3    0.2     0.     0.     0.3    0.4    0.6
0.8    0.8    0.7    0.6
```

```
250.  *     1.     1.     1.    1.1    1.1     1.    1.1    1.1    0.9    0.7    0.4    0.3    0.2    0.7    0.7    0.9
0.9     1.    0.8    0.8
260.  *    1.3    1.3    1.3    1.5    1.6    1.6    1.6    1.6    1.5    1.1    0.9    0.6    0.5    0.8    0.8     1.
1.     1.    0.9    1.1
270.  *    1.5    1.5    1.5    1.7    1.7    1.7    1.7    1.7    1.6    1.4    1.1    0.9    0.9    0.8    0.8     1.
1.     1.    1.3    1.3
280.  *    1.4    1.4    1.4    1.5    1.6    1.5    1.6    1.5    1.5    1.3    1.1    0.9    0.9    0.7    0.7    0.9
1.    0.9    1.2    1.2
290.  *    1.2    1.3    1.4    1.4    1.4    1.4    1.4    1.4    1.4    1.2     1.    0.9    0.9    0.5    0.5    0.8
1.    1.1    1.2    1.2
300.  *    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2     1.    0.9    0.9    0.7    0.5    0.9    0.9
1.1    1.1    1.1    1.1
310.  *    1.2    1.2    1.2    1.2    1.2    1.1    1.1    1.1     1.     1.    0.9    0.7    0.7    0.9    0.9    0.9
1.1    1.1    1.1    1.1
320.  *     1.    0.9    0.9    0.9    0.9    0.9    0.9    0.9     1.    0.9    0.8    0.7    0.7    0.8    0.8    0.9
1.1    1.1    1.1    1.1
330.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.7    0.7    0.8    0.8    0.9
1.1    1.1    1.1    1.1
340.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.7    0.7    0.7    0.9    0.8    0.9
1.1    1.1    1.1     1.
350.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.9    0.7    0.9    0.8    0.9
1.1    1.1    1.1     1.
360.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9     1.    0.9    0.9    0.9    0.8    0.8     1.
1.1    1.1     1.     1.

------*-----------------------------------------------------------------------------------------------------------------
----------------------
MAX   *     2.     2.    1.9     2.     2.    1.8    1.9    1.7    1.6    1.4    1.1     1.    0.9     1.    1.1    1.2
1.2    1.1    1.3    1.3
DEGR. *     70     60     60     60     60     60     60     50     50    270    270     10      0     30     30     20
50      0    270    270
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)	REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88	REC89	REC90	REC91	REC92	REC93	REC94	REC95	REC96	REC97	REC98	REC99	REC100
.	*	1.	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.6	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.
10.	*	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.5	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.
20.	*	1.	0.9	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.5	0.2	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1
30.	*	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.4	0.3	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
40.	*	1.	1.	1.	1.	0.9	0.8	0.8	0.8	0.7	0.4	0.3	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
50.	*	1.	0.9	0.9	0.9	0.8	0.9	0.8	0.8	0.6	0.4	0.3	0.	0.	0.1	0.1	0.1	0.2	0.2	0.2	0.2
60.	*	0.9	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.5	0.3	0.3	0.	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3
70.	*	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.7	0.4	0.2	0.2	0.1	0.2	0.3	0.4	0.4	0.4	0.5	0.5	0.5
80.	*	0.4	0.4	0.5	0.4	0.4	0.4	0.3	0.4	0.3	0.1	0.1	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.7	0.7
90.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.3	0.2	0.	0.	0.3	0.4	0.5	0.6	0.6	0.8	0.8	0.9	0.9
100.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.	0.	0.2	0.3	0.4	0.6	0.8	0.9	0.9	0.9	1.
110.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.2	0.4	0.5	0.6	0.7	0.7	0.8	0.8	0.8
120.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.2	0.4	0.5	0.6	0.7	0.8	0.8	0.8	0.8
130.	*	0.	0.	0.1	0.	0.	0.	0.	0.1	0.1	0.	0.	0.2	0.4	0.5	0.7	0.8	0.8	0.8	0.8	0.8
140.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.	0.	0.2	0.4	0.5	0.7	0.8	0.7	0.7	0.7	0.7

```
150.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.2    0.4    0.6    0.7    0.7
0.7    0.7    0.7    0.7
160.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.3    0.5    0.6    0.7    0.7
0.7    0.7    0.7    0.7
170.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.3    0.6    0.7    0.7    0.7
0.7    0.7    0.7    0.7
180.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.5    0.7    0.8    0.7    0.7
0.7    0.7    0.7    0.7
190.  *     0.     0.    0.1    0.1     0.    0.1     0.    0.1    0.1    0.1    0.     0.6    0.8    0.8    0.8    0.8
0.8    0.8    0.8    0.9
200.  *    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.6    0.8    0.8    0.8    0.8
0.8    0.8    0.8    0.9
210.  *    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.2    0.1    0.1    0.1    0.8    0.9    0.9    0.9    0.8
0.8    0.8    0.9     1.
220.  *    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.1    0.8     1.     1.     1.     1.
1.     1.    1.1    1.2
230.  *    0.3    0.2    0.3    0.2    0.2    0.2    0.2    0.4    0.4    0.4    0.3     1.     1.    1.1    1.1     1.
1.    1.1    1.2    1.3
240.  *    0.5    0.4    0.5    0.4    0.4    0.4    0.4    0.6    0.6    0.6    0.6    1.2    1.2    1.2    1.3    1.2
1.2    1.3    1.5    1.8
250.  *    0.8    0.8    0.9     1.    0.9    0.9    0.9    1.2    1.2    1.2    1.1    1.1    1.1    1.1     1.     1.
1.1    1.2    1.4    1.5
260.  *    1.1    1.2    1.4    1.4    1.2    1.2    1.2    1.5    1.4    1.5    1.3    0.7    0.6    0.6    0.6    0.7
0.7    0.7    0.8    0.9
270.  *    1.1    1.1    1.2    1.1    1.2    1.3    1.3    1.5    1.5    1.4    1.2    0.2    0.2    0.3    0.4    0.4
0.4    0.4    0.4    0.5
280.  *    1.2    1.3    1.3    1.2    1.2    1.2    1.2    1.3    1.3    1.3    1.1    0.1    0.1    0.1    0.1    0.1
0.1    0.2    0.2    0.2
290.  *    1.2    1.2    1.2    1.2    1.1    1.1     1.    1.1    1.1    1.1    0.9    0.1    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
300.  *    1.1    1.1     1.     1.    1.1    0.9     1.    0.8    0.8    0.9    0.7     0.    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
310.  *    1.1     1.     1.     1.    0.9    0.8    0.8    0.8    0.8    0.8    0.6     0.     0.    0.1    0.1    0.1
0.1    0.1    0.1    0.1
320.  *     1.     1.     1.    0.9    0.8    0.8    0.8    0.8    0.8    0.8    0.5     0.     0.     0.     0.     0.
0.     0.     0.     0.
330.  *     1.     1.    0.9    0.9    0.8    0.8    0.8    0.7    0.8    0.7    0.4     0.     0.     0.     0.     0.
0.     0.     0.     0.
340.  *     1.     1.    0.9    0.8    0.8    0.8    0.8    0.7    0.7    0.7    0.4     0.     0.     0.     0.     0.
0.     0.     0.     0.
```

```
 350.  *     1.    0.9    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.7    0.3     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 360.  *     1.    0.9    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.6    0.3     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.2    1.3    1.4    1.4    1.2    1.3    1.3    1.5    1.5    1.5    1.3    1.2    1.2    1.2    1.3    1.2
 1.2    1.3    1.5    1.8
 DEGR. *    280    280    260    260    260    270    270    260    270    260    260    240    240    240    240    240
 240    240    240    240
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC101 REC102 REC103 REC104 REC105 REC106 REC107 REC108 REC109 REC110 REC111 REC112 REC113 REC114 REC115 REC116
 REC117 REC118 REC119 REC120

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    .  *     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.     0.6    0.5    0.3    0.3    0.3
   0.3    0.3    0.4    0.5
  10.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.3    0.3    0.3    0.4    0.3
  0.5    0.5    0.5    0.8
  20.  *    0.1    0.1    0.1    0.1    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.4    0.4    0.3    0.7
  0.7    0.8    0.7     1.
  30.  *    0.1    0.1    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.4    0.5    0.5    0.8    0.8
  0.9    0.8    0.8    1.1
  40.  *    0.1    0.1    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.5    0.7    0.8    0.7    0.8
  0.9    0.9    0.8    0.8
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 50.  *    0.2    0.3    0.3    0.3    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.7    0.8    0.8    0.8    0.8
 0.8    0.7    0.7    0.7
 60.  *    0.3    0.4    0.5    0.5    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.8    0.8    0.5    0.7    0.5
 0.6    0.7    0.7    0.6
 70.  *    0.5    0.7    0.9    1.1    1.3     1.     1.    1.1    1.1    1.1    1.2    0.3    0.3    0.4    0.4    0.6
 0.4    0.5    0.5    0.5
 80.  *    0.8    1.1    1.2    1.4    1.6    1.5    1.5    1.5    1.5    1.6    1.6    0.2    0.1    0.2    0.3    0.4
 0.5    0.5    0.5    0.4
 90.  *    0.9    1.3    1.5    1.6    1.8    1.6    1.7    1.7    1.7    1.8    1.9    0.1    0.3    0.3    0.3    0.4
 0.5    0.5    0.5    0.4
100.  *     1.    1.3    1.5    1.6    1.7    1.5    1.5    1.7    1.7    1.7    1.7    0.3    0.3    0.3    0.4    0.5
0.5    0.5    0.4    0.4
110.  *    0.9    1.2    1.3    1.4    1.4    1.6    1.6    1.6    1.6    1.6    1.5    0.3    0.3    0.3    0.4    0.5
0.5    0.4    0.4    0.4
120.  *    0.9    1.2    1.3    1.3    1.4    1.4    1.4    1.4    1.3    1.3    1.3    0.3    0.3    0.4    0.5    0.5
0.4    0.4    0.4    0.5
130.  *    0.9    1.2    1.3    1.3    1.4    1.4    1.4    1.4    1.3    1.3    1.3    0.2    0.2    0.3    0.3    0.4
0.4    0.5    0.5    0.6
140.  *    0.8    1.1    1.1    1.1    1.3    1.3    1.2    1.2    1.2    1.2    1.1    0.2    0.2    0.3    0.3    0.3
0.4    0.4    0.4    0.4
150.  *    0.8    1.2    1.1    1.2    1.2    1.1    1.1    1.1    1.2    1.2    1.1    0.1    0.1    0.1    0.3    0.3
0.4    0.4    0.4    0.4
160.  *    0.9    1.2    1.2    1.3    1.3    1.2    1.2    1.2    1.2    1.4    1.1     0.     0.    0.1    0.1    0.1
0.2    0.2    0.2    0.3
170.  *     1.    1.2    1.2    1.3    1.3    1.2    1.1    1.2    1.3    1.5    1.1     0.     0.     0.     0.     0.
0.1    0.1    0.1    0.2
180.  *    1.1    1.1    1.2    1.2    1.2    1.2    1.2    1.3    1.5    1.3     1.     0.     0.     0.     0.     0.
0.     0.     0.    0.1
190.  *    1.1    1.2    1.4    1.4    1.4    1.3    1.5    1.6    1.4     1.    0.8     0.     0.     0.     0.     0.
0.     0.     0.    0.1
200.  *    1.4    1.4    1.5    1.5    1.5    1.5    1.5    1.4    1.3    1.1    0.7     0.     0.     0.     0.     0.
0.     0.     0.     0.
210.  *    1.3    1.5    1.5    1.6    1.5    1.6    1.4    1.3    1.1     1.    0.7     0.     0.     0.     0.     0.
0.     0.     0.     0.
220.  *    1.5    1.7    1.6    1.7    1.6    1.5    1.3    1.2    1.2    0.8    0.6     0.     0.     0.     0.     0.
0.     0.     0.     0.
230.  *    1.7    1.8    1.8    1.7    1.7    1.5    1.4    1.3    1.1    1.1    0.9     0.     0.     0.     0.     0.
0.     0.     0.     0.
240.  *     2.     2.    1.9    1.8    1.9    1.7    1.5    1.4    1.3     1.    0.8     0.     0.     0.     0.     0.
0.     0.     0.     0.
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250.  *    1.6    1.6    1.6    1.6    1.6    1.3    1.1    1.1     1.     1.    0.8    0.2    0.1    0.1     0.     0.
0.     0.     0.     0.
260.  *     1.    1.1    1.1    1.1    1.2    0.9    0.8    0.7    0.6    0.6    0.5    0.4    0.3    0.3    0.2    0.1
0.1     0.     0.     0.
270.  *    0.5    0.5    0.5    0.6    0.6    0.3    0.3    0.3    0.4    0.3    0.3    0.7    0.6    0.6    0.3    0.3
0.2    0.2    0.1    0.1
280.  *    0.3    0.3    0.3    0.3    0.4    0.3    0.3    0.4    0.4    0.4    0.5    0.7    0.7    0.6    0.6    0.5
0.4    0.3    0.3    0.2
290.  *    0.2    0.2    0.2    0.2    0.2    0.1    0.4    0.4    0.4    0.3    0.4    0.7    0.7    0.6    0.6    0.5
0.4    0.4    0.4    0.4
300.  *    0.2    0.2    0.2    0.2    0.2    0.1    0.2    0.3    0.4    0.3    0.3    0.7    0.6    0.6    0.5    0.4
0.4    0.4    0.4    0.4
310.  *    0.1    0.1    0.1    0.1    0.1     0.     0.    0.1    0.1    0.2    0.3    0.6    0.6    0.5    0.4    0.4
0.4    0.4    0.4    0.4
320.  *     0.     0.    0.1    0.1    0.1     0.     0.     0.    0.1    0.1    0.1    0.6    0.6    0.4    0.4    0.4
0.3    0.3    0.3    0.4
330.  *     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.    0.1    0.7    0.5    0.4    0.4    0.4
0.3    0.3    0.2    0.3
340.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.5    0.5    0.4    0.2    0.2
0.2    0.2    0.3    0.4
350.  *     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.6    0.4    0.4    0.5    0.4
0.3    0.3    0.3    0.5
360.  *     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.    0.6    0.5    0.3    0.3    0.3
0.3    0.3    0.4    0.5

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MAX   *     2.     2.    1.9    1.8    1.9    1.7    1.7    1.7    1.7    1.8    1.9    0.8    0.8    0.8    0.8    0.8
0.9    0.9    0.8    1.1
DEGR. *    240    240    240    240    240    240     90     90     90     90     90     60     50     40     30     30
30     40     30     30
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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC121	REC122	REC123	REC124	REC125	REC126	REC127	REC128	REC129	REC130	REC131	REC132	REC133	REC134	REC135	REC136	REC137	REC138	REC139	REC140
.	*	0.5	0.6	0.5	0.5	0.6	0.7	0.7	0.7	0.6	0.4	0.4	0.4	0.4	0.6	0.6	0.6	0.9	0.9	1.	1.1
10.	*	1.	0.9	1.	1.	1.	0.9	0.9	0.9	0.8	0.1	0.3	0.3	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7
20.	*	1.1	1.	1.	0.9	1.	0.9	0.9	0.7	0.7	0.1	0.2	0.2	0.3	0.3	0.4	0.6	0.6	0.6	0.6	0.7
30.	*	1.	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.5	0.5	0.7	0.7
40.	*	0.8	0.6	0.6	0.6	0.6	0.5	0.5	0.6	0.3	0.	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.5	0.6
50.	*	0.7	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.2	0.2	0.4
60.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.3
70.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2
80.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2
90.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2
100.	*	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2
110.	*	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.2
120.	*	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.1	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.2	0.2
130.	*	0.5	0.4	0.4	0.4	0.4	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.2	0.2	0.3	0.3
140.	*	0.4	0.4	0.4	0.4	0.4	0.2	0.2	0.1	0.	0.	0.	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4

150. * 0.4 0.4 0.3 0.3 0.2 0.2 0.2 0.1 0. 0. 0.1 0.2 0.4 0.4 0.5 0.5
0.7 0.8 0.8 0.9
160. * 0.3 0.3 0.3 0.2 0.2 0.2 0.1 0.1 0. 0.1 0.2 0.4 0.5 0.6 0.8 0.8
0.9 1. 1. 1.1
170. * 0.2 0.2 0.2 0.2 0.1 0.1 0.1 0.1 0. 0.1 0.4 0.6 0.7 0.7 0.9 1.
1.1 1.2 1.2 1.3
180. * 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0. 0. 0.2 0.5 0.7 0.7 0.9 1. 1.1
1.1 1.1 1.1 1.3
190. * 0.1 0.1 0.1 0.1 0. 0. 0. 0. 0. 0.3 0.5 0.7 0.8 0.8 0.8 0.9
0.9 0.9 0.9 1.1
200. * 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.3 0.5 0.7 0.7 0.8 0.8 0.8
0.8 0.8 0.8 1.
210. * 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.3 0.5 0.7 0.7 0.7 0.7 0.7
0.7 0.7 0.7 1.
220. * 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.3 0.5 0.7 0.7 0.7 0.7 0.7
0.7 0.7 0.7 0.9
230. * 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.3 0.5 0.6 0.6 0.6 0.6 0.6
0.6 0.6 0.7 0.9
240. * 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.5 0.6 0.6 0.6 0.6 0.6 0.6
0.6 0.6 0.8 0.9
250. * 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.5 0.6 0.6 0.6 0.6 0.7 0.6
0.6 0.6 0.8 0.9
260. * 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.5 0.6 0.6 0.6 0.6 0.6 0.6
0.6 0.6 0.9 0.9
270. * 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.5 0.6 0.6 0.6 0.6 0.6 0.6
0.7 0.7 1.1 1.1
280. * 0.2 0.1 0.1 0.1 0. 0. 0. 0. 0. 0.5 0.6 0.6 0.7 0.7 0.8 0.9
0.9 0.8 1.2 1.3
290. * 0.2 0.2 0.2 0.2 0.1 0.1 0.1 0.1 0. 0.6 0.8 0.8 0.9 0.9 0.9 0.9
1. 1.2 1.4 1.3
300. * 0.4 0.3 0.3 0.2 0.2 0.2 0.2 0.1 0.1 0.9 0.9 0.9 0.9 0.9 1. 1.1
1. 1.2 1.4 1.4
310. * 0.4 0.4 0.4 0.4 0.3 0.3 0.3 0.2 0.2 0.9 0.9 0.9 0.9 0.9 0.9 1.
1. 1.1 1.3 1.5
320. * 0.4 0.4 0.3 0.3 0.3 0.3 0.3 0.2 0.2 0.9 1. 1. 1.1 1.2 1.2 1.1
1.3 1.3 1.3 1.3
330. * 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 1. 1. 1.1 1.1 1.1 1.3 1.4
1.3 1.5 1.5 1.3
340. * 0.4 0.4 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.8 0.8 0.9 0.9 0.9 1.1 1.2
1.2 1.4 1.4 1.2

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 350.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.6    0.7    0.7    0.7    0.9    0.9
 1.    1.1    1.1    1.1
 360.  *    0.5    0.6    0.5    0.5    0.6    0.7    0.7    0.7    0.6    0.4    0.4    0.4    0.4    0.6    0.6    0.6
 0.9    0.9     1.    1.1

 ------*-------------------------------------------------------------------------------------------------------------------
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 MAX   *    1.1     1.     1.     1.     1.    0.9    0.9    0.9    0.8     1.     1.    1.1    1.1    1.2    1.3    1.4
 1.3    1.5    1.5    1.5
 DEGR. *     20     20     10     10     10     10     10     10     10    330    320    330    320    320    330    330
 320    330    330    310
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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) REC141	REC142	REC143	REC144	REC145	REC146
.	* 0.8	0.6	0.7	0.7	0.8	0.8
10.	* 0.6	0.5	0.5	0.7	0.8	0.8
20.	* 0.5	0.6	0.6	0.6	0.8	0.9
30.	* 0.5	0.5	0.5	0.7	0.7	0.9
40.	* 0.4	0.5	0.5	0.7	0.7	0.7
50.	* 0.3	0.4	0.4	0.5	0.6	0.9
60.	* 0.2	0.2	0.2	0.3	0.5	0.7
70.	* 0.	0.	0.1	0.2	0.2	0.3
80.	* 0.	0.	0.	0.	0.	0.1
90.	* 0.	0.	0.	0.	0.	0.
100.	* 0.	0.	0.	0.	0.	0.
110.	* 0.	0.	0.	0.	0.	0.
120.	* 0.	0.	0.	0.	0.	0.

130.	*	0.1	0.	0.	0.	0.	0.
140.	*	0.2	0.1	0.	0.	0.	0.
150.	*	0.6	0.2	0.2	0.	0.	0.
160.	*	0.8	0.6	0.3	0.2	0.1	0.
170.	*	1.1	0.9	0.8	0.5	0.3	0.1
180.	*	1.1	1.	0.9	0.7	0.6	0.4
190.	*	1.1	1.	0.9	0.8	0.7	0.5
200.	*	1.1	0.9	0.8	0.8	0.7	0.5
210.	*	1.	0.9	0.8	0.8	0.6	0.4
220.	*	1.	0.8	0.8	0.7	0.5	0.3
230.	*	0.9	0.8	0.8	0.6	0.3	0.3
240.	*	0.9	0.8	0.7	0.5	0.3	0.3
250.	*	0.8	0.8	0.7	0.6	0.4	0.6
260.	*	1.	1.	0.9	0.7	0.6	0.8
270.	*	1.2	1.1	0.8	0.9	0.8	0.9
280.	*	1.3	1.2	0.9	1.	0.7	0.6
290.	*	1.4	1.1	0.9	0.9	0.7	0.5
300.	*	1.3	1.1	0.8	0.5	0.4	0.4
310.	*	1.	0.8	0.6	0.5	0.4	0.5
320.	*	1.1	1.	0.7	0.4	0.7	0.8
330.	*	1.1	0.7	0.5	0.4	0.5	0.7
340.	*	0.8	0.4	0.2	0.4	0.5	0.7
350.	*	0.7	0.6	0.5	0.6	0.7	0.7
360.	*	0.8	0.6	0.7	0.7	0.8	0.8
MAX	*	1.4	1.2	0.9	1.	0.8	0.9
DEGR.	*	290	280	180	280	0	20

THE HIGHEST CONCENTRATION OF 2.00 ppm OCCURRED AT RECEPTOR REC62.

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*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/6/2012 1:12:44 PM
** File: F:\2975 FirstLight\Microscale\Worst\34 Dean Longmeadow & Owen LOS&ADT\2022AAM.ou2
**
*********************************************
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 A AM RUN: CAL3QHC RUN

DATE : 12/ 6/12
TIME : 13:12:43

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE
VPH EF H W V/C QUEUE	*	X1	Y1	X2	Y2	*	(M)		
	*	(DEG)	(G/MI)	(M)	(M)	(VEH)			
1. Dean EB LL	*	235106.84	850497.38	235156.62	850512.50	*	52.	73.	AG
7. 8.5 0.0 9.0									
2. Dean EB LL QUEUE	*	235156.62	850512.50	235155.20	850512.06	*	1.	253.	AG
116. 100.0 0.0 3.0 0.47 0.2									
3. Dean EB TR	*	235066.06	850482.19	235155.91	850506.75	*	93.	75.	AG

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 1033.   8.5   0.0   13.4
 4. Dean EB TR QUEUE                  *  235155.91    850506.75   234930.83    850445.19 *     233.   255. AG
 172. 100.0   0.0    7.4 1.09  38.9
 5. Dean WB LL                        *  235225.55    850536.69   235185.14    850524.44 *      42.   253. AG
 171.   8.5   0.0    9.4
 6. Dean WB LL QUEUE                  *  235185.14    850524.44   235270.17    850550.19 *      89.    73. AG
 107. 100.0   0.0    3.4 1.08  14.8
 7. Dean WB TR                        *  235275.70    850557.25   235185.14    850530.19 *      95.   253. AG
 634.   8.5   0.0   13.4
 8. Dean WB TR QUEUE                  *  235185.14    850530.19   235218.55    850540.19 *      35.    73. AG
 135. 100.0   0.0    7.4 0.42   5.8
 9. Owen NB LL                        *  235207.16    850428.06   235179.00    850508.50 *      85.   341. AG
 140.   8.5   0.0    9.7
10. Owen NB LL QUEUE                  *  235179.00    850508.50   235185.94    850488.69 *      21.   161. AG
92. 100.0   0.0    3.7 0.37   3.5
11. Owen NB T                         *  235208.59    850429.88   235181.17    850508.88 *      84.   341. AG
352.   8.5   0.0    9.7
12. Owen NB T QUEUE                   *  235181.17    850508.88   235203.38    850444.88 *      68.   161. AG
92. 100.0   0.0    3.7 0.93  11.3
13. Owen NB R                         *  235207.52    850436.38   235189.47    850493.75 *      60.   343. AG
320.   8.5   0.0    9.7
14. Owen NB R QUEUE                   *  235189.47    850493.75   235205.72    850442.06 *      54.   163. AG
92. 100.0   0.0    3.7 0.84   9.0
15. Longmeadow SB L                   *  235147.36    850577.25   235162.05    850535.25 *      44.   161. AG
109.   8.5   0.0    9.0
16. Longmeadow SB L QUEUE             *  235162.05    850535.25   235156.73    850550.69 *      16.   341. AG
92. 100.0   0.0    3.0 0.29   2.7
17. Longmeadow SB TR                  *  235134.16    850612.38   235159.88    850533.06 *      83.   162. AG
346.   8.5   0.0    9.0
18. Longmeadow SB TR QUEUE            *  235159.88    850533.06   235139.84    850594.56 *      65.   342. AG
92. 100.0   0.0    3.0 0.91  10.8
19. Dean EB OUTBOUND                  *  235195.64    850518.06   235273.02    850547.94 *      83.    69. AG
1208.   8.5   0.0   13.4
20. Dean WB OUTBOUND                  *  235156.41    850522.00   235064.98    850493.25 *      96.   253. AG
689.   8.5   0.0   13.4
21. Longmeadow NB OUTBOUND            *  235170.09    850535.00   235137.33    850611.62 *      83.   337. AG
458.   8.5   0.0    9.0
22. Owen SB OUTBOUND                  *  235175.48    850492.88   235201.41    850426.62 *      71.   159. AG
757.   8.5   0.0    9.7
23. EBL                               *  235157.16    850512.56   235169.77    850534.62 *      25.    30.
```

AG 7. 9.4 0.0 9.0
24. EBT * 235156.48 850506.94 235194.47 850517.81 * 40. 74. AG
779. 8.5 0.0 12.0
25. EBR * 235146.28 850504.06 235174.59 850494.12 * 30. 109. AG
254. 10.3 0.0 9.0
26. WBL * 235183.81 850524.38 235172.95 850497.75 * 29. 202. AG
171. 9.4 0.0 9.0
27. WBT * 235184.27 850530.12 235156.48 850522.06 * 29. 254. AG
535. 8.5 0.0 12.0
28. WBR * 235184.27 850529.44 235168.45 850535.38 * 17. 291. AG
99. 10.3 0.0 9.0
29. NBL * 235178.67 850509.50 235156.05 850521.88 * 26. 299. AG
140. 9.4 0.0 9.0
30. NBT * 235180.75 850510.00 235170.09 850534.50 * 27. 336. AG
352. 8.5 0.0 9.0
31. NBR * 235188.33 850495.06 235198.97 850518.94 * 26. 24. AG
320. 10.3 0.0 9.0
32. SBL * 235162.09 850534.69 235188.55 850516.94 * 32. 124. AG
109. 9.4 0.0 9.0
33. SBT * 235159.89 850532.50 235173.73 850497.75 * 37. 158. AG
332. 8.5 0.0 9.0
34. SBR * 235160.44 850532.31 235155.61 850521.56 * 12. 204. AG
14. 10.3 0.0 9.0

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 A AM RUN: CAL3QHC
RUN

DATE : 12/ 6/12
TIME : 13:12:43

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Dean EB LL QUEUE	*	120	113	4.0	7	1900	45.89	3	3

4. Dean EB TR QUEUE	*	120	84	4.0	1033	1900	45.89	3	3
6. Dean WB LL QUEUE	*	120	104	4.0	171	1900	45.89	3	3
8. Dean WB TR QUEUE	*	120	66	4.0	634	1900	45.89	3	3
10. Owen NB LL QUEUE	*	120	90	4.0	140	1900	45.89	3	3
12. Owen NB T QUEUE	*	120	90	4.0	352	1900	45.89	3	3
14. Owen NB R QUEUE	*	120	90	4.0	320	1900	45.89	3	3
16. Longmeadow SB L QUEUE	*	120	90	4.0	109	1900	45.89	3	3
18. Longmeadow SB TR QUEUE	*	120	90	4.0	346	1900	45.89	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235178.36	850537.06	1.8	*
2. LR_2	*	235171.39	850540.94	1.8	*
3. LR_3	*	235169.19	850544.88	1.8	*
4. LR_4	*	235166.98	850548.81	1.8	*
5. LR_5	*	235163.70	850553.81	1.8	*
6. LR_6	*	235161.97	850558.50	1.8	*
7. LR_7	*	235160.23	850563.19	1.8	*
8. LR_8	*	235158.48	850567.88	1.8	*
9. LR_9	*	235156.75	850572.56	1.8	*
10. LR_10	*	235155.02	850577.25	1.8	*
11. LR_11	*	235153.27	850581.94	1.8	*
12. LR_12	*	235151.53	850586.62	1.8	*
13. LR_13	*	235149.80	850591.31	1.8	*
14. LR_14	*	235148.05	850596.00	1.8	*
15. LR_15	*	235146.31	850600.69	1.8	*
16. LR_16	*	235144.56	850605.38	1.8	*
17. LR_17	*	235142.83	850610.06	1.8	*
18. LR_18	*	235130.50	850610.00	1.8	*
19. LR_19	*	235132.23	850605.31	1.8	*
20. LR_20	*	235133.98	850600.62	1.8	*
21. LR_21	*	235135.72	850595.94	1.8	*
22. LR_22	*	235137.45	850591.25	1.8	*
23. LR_23	*	235139.20	850586.56	1.8	*
24. LR_24	*	235140.94	850581.88	1.8	*
25. LR_25	*	235142.69	850577.19	1.8	*

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 A AM RUN: CAL3QHC
RUN

RECEPTOR	COORDINATES (M) X	Y	Z
26. LR_26	235144.42	850572.50	1.8
27. LR_27	235146.16	850567.81	1.8
28. LR_28	235147.91	850563.12	1.8
29. LR_29	235149.64	850558.44	1.8
30. LR_30	235151.38	850553.75	1.8
31. LR_31	235153.12	850549.06	1.8
32. LR_32	235154.86	850544.38	1.8
33. LR_33	235154.91	850539.38	1.8
34. LR_34	235156.66	850534.69	1.8
35. LR_35	235153.22	850528.19	1.8
36. LR_36	235149.31	850523.50	1.8
37. LR_37	235144.55	850522.06	1.8
38. LR_38	235139.75	850520.56	1.8
39. LR_39	235134.97	850519.12	1.8
40. LR_40	235130.19	850517.69	1.8
41. LR_41	235125.41	850516.25	1.8
42. LR_42	235120.62	850514.75	1.8
43. LR_43	235115.83	850513.31	1.8
44. LR_44	235111.05	850511.88	1.8
45. LR_45	235106.27	850510.38	1.8
46. LR_46	235101.48	850508.94	1.8
47. LR_47	235096.70	850507.50	1.8
48. LR_48	235091.92	850506.00	1.8
49. LR_49	235087.12	850504.56	1.8
50. LR_50	235082.34	850503.12	1.8
51. LR_51	235077.56	850501.69	1.8
52. LR_52	235072.78	850500.19	1.8
53. LR_53	235068.00	850498.75	1.8
54. LR_54	235063.20	850497.31	1.8
55. LR_55	235073.41	850479.50	1.8
56. LR_56	235078.19	850480.94	1.8
57. LR_57	235082.97	850482.38	1.8
58. LR_58	235087.75	850483.81	1.8
59. LR_59	235092.55	850485.31	1.8

60. LR_60	*	235097.31	850486.75	1.8 *
61. LR_61	*	235102.09	850488.19	1.8 *
62. LR_62	*	235107.00	850489.25	1.8 *
63. LR_63	*	235111.78	850490.69	1.8 *
64. LR_64	*	235116.56	850492.12	1.8 *
65. LR_65	*	235121.34	850493.56	1.8 *
66. LR_66	*	235126.88	850494.75	1.8 *
67. LR_67	*	235131.12	850496.00	1.8 *
68. LR_68	*	235135.80	850497.12	1.8 *
69. LR_69	*	235140.27	850497.81	1.8 *
70. LR_70	*	235145.27	850497.75	1.8 *
71. LR_71	*	235149.83	850496.81	1.8 *
72. LR_72	*	235153.11	850496.06	1.8 *
73. LR_73	*	235156.19	850495.12	1.8 *
74. LR_75	*	235202.16	850511.88	1.8 *
75. LR_76	*	235204.62	850514.00	1.8 *
76. LR_77	*	235207.84	850516.75	1.8 *
77. LR_79	*	235212.31	850520.25	1.8 *
78. LR_80	*	235217.08	850521.75	1.8 *

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 A AM RUN: CAL3QHC
RUN

RECEPTOR	*	X	Y	Z *
	*	COORDINATES (M)		*
79. LR_81	*	235221.84	850523.25	1.8 *
80. LR_82	*	235226.45	850524.75	1.8 *
81. LR_83	*	235231.23	850526.25	1.8 *
82. LR_84	*	235236.00	850527.75	1.8 *
83. LR_85	*	235240.45	850530.38	1.8 *
84. LR_86	*	235245.23	850531.88	1.8 *
85. LR_87	*	235249.98	850533.38	1.8 *
86. LR_88	*	235254.45	850535.50	1.8 *
87. LR_89	*	235259.22	850537.00	1.8 *
88. LR_90	*	235263.38	850541.00	1.8 *
89. LR_91	*	235268.14	850542.50	1.8 *
90. LR_92	*	235272.91	850544.00	1.8 *
91. LR_93	*	235277.69	850545.50	1.8 *
92. LR_94	*	235275.39	850561.56	1.8 *

93.	LR_95	*	235270.62	850560.06	1.8 *
94.	LR_96	*	235265.86	850558.56	1.8 *
95.	LR_97	*	235261.09	850557.00	1.8 *
96.	LR_98	*	235256.31	850555.50	1.8 *
97.	LR_99	*	235251.56	850554.00	1.8 *
98.	LR_100	*	235246.80	850552.50	1.8 *
99.	LR_101	*	235242.02	850551.00	1.8 *
**.	LR_102	*	235237.27	850549.50	1.8 *
**.	LR_103	*	235232.48	850548.00	1.8 *
**.	LR_104	*	235227.72	850546.50	1.8 *
**.	LR_105	*	235222.95	850545.00	1.8 *
**.	LR_106	*	235218.19	850543.44	1.8 *
**.	LR_107	*	235213.42	850541.94	1.8 *
**.	LR_108	*	235208.66	850541.38	1.8 *
**.	LR_109	*	235202.81	850539.88	1.8 *
**.	LR_110	*	235198.05	850538.38	1.8 *
**.	LR_111	*	235194.19	850537.31	1.8 *
**.	LR_112	*	235189.44	850535.81	1.8 *
**.	LR_113	*	235184.66	850534.31	1.8 *
**.	LR_114	*	235159.12	850493.88	1.8 *
**.	LR_115	*	235161.91	850492.31	1.8 *
**.	LR_116	*	235165.55	850490.00	1.8 *
**.	LR_117	*	235168.09	850487.94	1.8 *
**.	LR_118	*	235170.88	850485.00	1.8 *
**.	LR_119	*	235173.97	850481.00	1.8 *
**.	LR_120	*	235176.31	850476.75	1.8 *
**.	LR_121	*	235178.02	850473.00	1.8 *
**.	LR_122	*	235181.77	850468.19	1.8 *
**.	LR_123	*	235183.45	850463.50	1.8 *
**.	LR_124	*	235185.16	850458.81	1.8 *
**.	LR_125	*	235186.86	850454.12	1.8 *
**.	LR_126	*	235188.56	850449.38	1.8 *
**.	LR_127	*	235190.27	850444.69	1.8 *
**.	LR_128	*	235191.95	850440.00	1.8 *
**.	LR_129	*	235193.66	850435.31	1.8 *
**.	LR_130	*	235195.36	850430.56	1.8 *
**.	LR_131	*	235197.06	850425.88	1.8 *
**.	LR_132	*	235211.48	850433.06	1.8 *
**.	LR_133	*	235209.78	850437.75	1.8 *

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JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 A AM RUN: CAL3QHC
RUN

RECEPTOR	COORDINATES (M) X	Y	Z
**. LR_134	235208.08	850442.50	1.8
**. LR_135	235206.38	850447.19	1.8
**. LR_136	235204.69	850451.88	1.8
**. LR_137	235202.98	850456.56	1.8
**. LR_138	235201.28	850461.25	1.8
**. LR_139	235199.58	850466.00	1.8
**. LR_140	235197.88	850470.69	1.8
**. LR_141	235196.19	850475.38	1.8
**. LR_142	235194.48	850480.06	1.8
**. LR_143	235194.25	850485.06	1.8
**. LR_144	235194.02	850489.75	1.8
**. LR_145	235194.09	850494.19	1.8
**. LR_146	235194.45	850498.88	1.8
**. LR_147	235195.98	850503.62	1.8
**. LR_148	235199.00	850508.31	1.8

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.				

```
   0.     0.    0.1    0.1
 10.  *     0.     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 20.  *     0.     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 30.  *     0.     0.     0.     0.    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 60.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.2    0.2
 70.  *    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.2    0.2
 80.  *    0.6    0.4    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 90.  *    0.9    0.5    0.4    0.4    0.3     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
100.  *     1.    0.7    0.5    0.4    0.4    0.3    0.3    0.2     0.     0.     0.     0.     0.     0.     0.     0.
0.    0.2    0.2    0.2
110.  *     1.    0.6    0.5    0.5    0.5    0.5    0.4    0.4    0.3    0.2    0.1     0.     0.     0.     0.     0.
0.    0.2    0.2    0.2
120.  *    0.8    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.2    0.2    0.2    0.1    0.1     0.
0.    0.2    0.3    0.4
130.  *    0.6    0.5    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.4    0.3    0.2    0.1    0.1
0.1    0.4    0.5    0.6
140.  *    0.6    0.4    0.5    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3
0.2    0.5    0.5    0.6
150.  *    0.4    0.5    0.5    0.4    0.5    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1
0.1    0.5    0.5    0.6
160.  *    0.5    0.9    0.7    0.8    0.7    0.5    0.4    0.4    0.3    0.3    0.4    0.3    0.3    0.3    0.3    0.4
0.4    0.5    0.5    0.6
170.  *    0.8    0.8    0.6    0.7    0.6    0.6    0.6    0.4    0.4    0.6    0.5    0.5    0.5    0.6    0.6    0.5
0.5    0.3    0.3    0.3

------*-------------------------------------------------------------------------------------------------------------
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MAX   *     1.    0.9    0.7    0.8    0.7    0.6    0.6    0.5    0.5    0.6    0.5    0.5    0.5    0.6    0.6    0.5
0.5    0.5    0.5    0.6
```

DEGR. * 100 160 160 160 160 170 170 120 130 170 170 170 170 170 170 170
170 140 130 130

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
180.	*	0.6	0.5	0.5	0.5	0.5	0.4	0.6	0.6	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.1	0.2	0.2
190.	*	0.3	0.5	0.5	0.7	0.6	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.1	0.2	0.2
200.	*	0.3	0.7	0.5	0.5	0.8	0.9	0.8	0.7	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.5	0.1	0.1	0.1
210.	*	0.6	0.6	0.6	0.8	1.	0.9	0.8	0.7	0.7	0.7	0.7	0.6	0.7	0.6	0.6	0.5	0.4	0.1	0.1	0.1
220.	*	0.7	0.6	0.7	0.9	1.	0.9	0.8	0.8	0.7	0.6	0.5	0.5	0.5	0.5	0.4	0.3	0.3	0.1	0.1	0.1
230.	*	0.7	0.6	0.8	0.9	0.9	0.8	0.8	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.3	0.3	0.1	0.1	0.1
240.	*	0.7	0.8	0.8	0.9	0.7	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.3	0.2	0.2	0.2	0.	0.	0.
250.	*	0.5	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.	0.	0.
260.	*	0.4	0.5	0.5	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.	0.	0.
270.	*	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.2				

```
0.2     0.     0.     0.
280.  *    0.3    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.2
0.2     0.     0.     0.
290.  *    0.4    0.5    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.4    0.4    0.3    0.3    0.2
0.1     0.     0.     0.
300.  *    0.4    0.5    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.3    0.3    0.3    0.2
0.1     0.     0.     0.
310.  *    0.3    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.4    0.3    0.3    0.3    0.1
0.1     0.     0.     0.
320.  *    0.3    0.5    0.5    0.6    0.6    0.6    0.6    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.2    0.1
0.     0.     0.     0.
330.  *    0.2    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.3    0.3    0.2    0.2    0.1    0.1
0.     0.     0.     0.
340.  *    0.1    0.2    0.2    0.3    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1
0.     0.    0.1    0.1
350.  *     0.    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1     0.
0.     0.    0.1    0.1
360.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.
0.     0.    0.1    0.1

------*-------------------------------------------------------------------------------------------------------------------------
---------------------
MAX   *     1.    0.9    0.8    0.9     1.    0.9    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.7    0.7    0.7
0.6    0.5    0.5    0.6
DEGR. *    100    160    230    220    210    200    190    190    200    200    200    190    190    190    190    190
180    140    130    130

      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
```

```
 REC37  REC38  REC39  REC40

 ------*-------------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.2    0.2    0.5    0.6    0.7    0.7    0.8    0.8    0.9    0.9     1.    1.2    0.9     1.    0.5    0.3
    0.2    0.1     0.     0.

 ------*-------------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.2    0.2    0.5    0.6    0.7    0.7    0.8    0.8    0.9    0.9     1.    1.2    0.9     1.    0.5    0.3
 0.2    0.1     0.     0.
 DEGR. *      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
 0      0      0      0
```



```
       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
 REC37  REC38  REC39  REC40

 ------*-------------------------------------------------------------------------------------------------------------------------
 ---------------------
  10.  *    0.2    0.2    0.5    0.6    0.7    0.7    0.8    0.8    0.8    0.8    0.9    0.9    0.8     1.    0.5    0.5
  0.3    0.1    0.1    0.1
  20.  *    0.2    0.3    0.5    0.5    0.6    0.6    0.6    0.6    0.6    0.7    0.7    0.9    0.8    0.8    0.5    0.5
  0.3    0.1    0.1    0.1
  30.  *    0.2    0.3    0.5    0.5    0.5    0.6    0.6    0.6    0.6    0.6    0.6    0.8    0.7    0.8    0.5    0.4
  0.5    0.2    0.2    0.2
  40.  *    0.2    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.6    0.8    0.7    0.7    0.4    0.4
  0.3    0.3    0.2    0.2
```

```
  50.  *    0.2    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.8    0.7    0.7    0.3    0.3
  0.3    0.3    0.3    0.2
  60.  *    0.2    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.8    0.7    0.7    0.1    0.3
  0.2    0.2    0.2    0.2
  70.  *    0.2    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.7    0.8    0.7    0.9    0.6    0.7
  0.7    0.7    0.7    0.7
  80.  *    0.2    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.7    0.9    1.1     1.    0.6    0.8
  0.7    0.7    0.7    0.8
  90.  *    0.3    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.8    1.1    1.2    1.1     1.    0.7    0.9
  0.8    0.7    0.8    0.6
 100.  *    0.3    0.5    0.5    0.5    0.5    0.5    0.7    0.8    0.9    0.9    1.3    1.3    1.1    0.8    0.7    0.6
 0.5    0.4    0.4    0.5
 110.  *    0.3    0.5    0.6    0.6    0.7    0.8     1.     1.     1.    1.1    1.3    1.3    1.1    0.9    0.5    0.5
 0.4    0.4    0.6    0.6
 120.  *    0.5    0.7    0.7    0.9    0.9     1.     1.     1.     1.    1.1    1.3    1.4     1.    0.7    0.3    0.7
 0.5    0.6    0.7    0.6
 130.  *    0.9    0.9     1.     1.     1.    0.9    0.9     1.    1.1     1.    1.1    1.1    0.8    0.6    0.5    0.7
 0.7    0.8    0.8    0.9
 140.  *    0.8    0.7    0.7    0.7    0.8    0.8    0.9    0.9    0.9    1.2    1.3    1.2    0.7    0.7    0.8    0.6
 0.8    0.7    0.8    0.8
 150.  *    0.7    0.7    0.7    0.7    0.7    1.1     1.    1.1     1.    1.3    1.4    1.4    0.9    0.7    0.7    0.7
 0.6    0.8    0.7    0.7
 160.  *    0.6    0.6    0.6    0.5    0.5    0.7    0.7    0.7     1.     1.    1.2    1.2    0.7    0.5    0.3    0.7
 0.6    0.7    0.7    0.7
 170.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.4    0.5    0.5    0.7    0.5    0.3    0.5    0.5
 0.7    0.7    0.7    0.7
 180.  *    0.2    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.6    0.6    0.4    0.6    0.5    0.7
 0.7    0.7    0.7    0.7
 190.  *    0.2    0.2    0.2    0.3    0.3    0.4    0.4    0.4    0.4    0.5    0.5    0.5    0.4    0.4    0.5    0.7
 0.7    0.7    0.7    0.7
 200.  *    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.6    0.4    0.4    0.7    0.7
 0.7    0.7    0.7    0.7
 210.  *    0.1    0.1    0.1    0.2    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.5    0.7    0.7
 0.7    0.7    0.7    0.7
 220.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.4    0.4    0.4    0.4    0.4    0.4    0.7    0.8    0.8
 0.8    0.8    0.8    0.8
 230.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.4    0.4    0.4    0.4    0.6    0.8    0.9
 0.9    0.9    0.9    0.9
 240.  *     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.4    0.4    0.6    0.7     1.
 1.     1.     1.    0.9
```

```
 250.  *     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.1    0.2    0.3    0.6    0.8
 0.8    0.8    0.8    0.8
 260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3    0.4
 0.4    0.4    0.4    0.4
 270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2
 0.2    0.2    0.2    0.2
 280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.     0.     0.     0.
 0.1    0.1    0.1     0.
 310.  *     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.2    0.2    0.     0.     0.     0.
 0.     0.     0.     0.
 320.  *     0.     0.    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.3    0.1    0.1     0.    0.1
 0.     0.     0.     0.
 330.  *    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.3    0.4    0.5    0.5    0.6    0.2    0.3     0.     0.
 0.     0.     0.     0.
 340.  *    0.1    0.1    0.1    0.3    0.4    0.4    0.6    0.6    0.7    0.8    0.8    0.9    0.5    0.6    0.2     0.
 0.     0.     0.     0.
 350.  *    0.1    0.2    0.4    0.5    0.6    0.6    0.7    0.8    0.8    0.9     1.    1.1    0.7    0.9    0.4    0.2
 0.1     0.     0.     0.
 360.  *    0.2    0.2    0.5    0.6    0.7    0.7    0.8    0.8    0.9    0.9     1.    1.2    0.9     1.    0.5    0.3
 0.2    0.1     0.     0.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.9    0.9     1.     1.     1.    1.1     1.    1.1    1.1    1.3    1.4    1.4    1.1     1.    0.8     1.
 1.     1.     1.    0.9
 DEGR. *    130    130    130    130    130    150    110    150    130    150    150    120     80      0    140    240
 240    240    240    130
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.	1.	1.	1.
10.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.	1.	1.	1.
20.	*	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.	1.1	1.1	1.1
30.	*	0.2	0.2	0.2	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.1	1.1	1.1	1.1	1.1	1.1
40.	*	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.4	1.4	1.4	1.3	1.3	1.3
50.	*	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.6	1.5	1.5	1.5	1.5	1.6
60.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.6	1.6	1.6	1.6	1.7	1.7
70.	*	0.7	0.7	0.6	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	1.5	1.5	1.6	1.6	1.7	1.7
80.	*	0.8	0.7	0.6	0.6	0.6	0.7	0.8	0.8	0.7	0.7	0.8	0.7	0.7	0.7	0.9	0.9	1.	1.	1.	1.
90.	*	0.6	0.8	0.7	0.7	0.8	0.6	0.6	0.6	0.8	0.8	0.8	0.8	0.9	0.8	0.5	0.5	0.5	0.6	0.6	0.6
100.	*	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.2	0.2	0.2	0.3	0.3	0.3
110.	*	0.7	0.7	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.8	0.1	0.1	0.1	0.1	0.2	0.2
120.	*	0.8	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.1	0.1	0.1	0.1	0.1	0.2
130.	*	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.	0.	0.1	0.1	0.1	0.1
140.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.	0.	0.	0.	0.	0.

```
150.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6     0.     0.
0.     0.     0.     0.
160.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.5     0.     0.
0.     0.     0.     0.
170.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.4     0.     0.
0.     0.     0.     0.
180.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.3     0.     0.
0.     0.     0.     0.
190.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.6    0.3     0.     0.
0.     0.     0.     0.
200.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.4    0.3     0.     0.
0.1    0.1    0.1    0.1
210.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.6    0.4    0.3     0.     0.1
0.1    0.1    0.1    0.2
220.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.8    0.7    0.6    0.5    0.4    0.      0.     0.1
0.1    0.2    0.2    0.2
230.  *    0.9    0.9    0.9    0.9    0.9    0.8    0.8    0.8    0.8    0.7    0.6    0.6    0.5    0.4    0.2     0.2
0.2    0.2    0.2    0.3
240.  *    0.9    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.6    0.6    0.6    0.5    0.4    0.4     0.5
0.5    0.5    0.6    0.7
250.  *    0.8    0.7    0.7    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.4    0.3    0.8     0.9
1.     1.     1.1    1.2
260.  *    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.1    1.2     1.2
1.3    1.5    1.5    1.6
270.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.     1.3     1.4
1.4    1.5    1.5    1.6
280.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.     1.1     1.2
1.2    1.3    1.5    1.5
290.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.     0.     0.     0.     1.      1.1
1.1    1.3    1.3    1.3
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.      1.
1.1    1.1    1.1    1.1
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.9     1.
1.     1.     1.1    1.1
320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.8     1.
1.     1.     1.     1.
330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.      1.
1.     1.     1.     1.
340.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.      1.
1.     1.     1.     1.
```

```
 350.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.     1.
 1.     1.     1.     1.
 360.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.     1.
 1.     1.     1.     1.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.9    0.9    0.9    0.9    0.9    1.6    1.6
 1.6    1.6    1.7    1.7
 DEGR. *    220    120    220    220    220    220    220    220     90    110    100    100     90    100     50     60
 60     60     60     60
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
 REC77  REC78  REC79  REC80

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *     1.     1.     1.     1.     1.     1.     1.     1.    1.1     1.     1.    0.8    0.6    0.7    0.7    0.7
   0.8    0.7    0.7    0.6
  10.  *     1.     1.     1.     1.     1.     1.    1.1    1.1    1.1     1.    0.9    0.8    0.5    0.7    0.7    0.9
  0.8    0.7    0.6    0.7
  20.  *    1.1    1.1    1.1    1.1    1.2    1.2    1.2    1.2    1.1    1.2    0.8    0.6    0.3    0.8    0.9    0.8
  0.8    0.7    0.7    0.7
  30.  *    1.1    1.1    1.2    1.2    1.2    1.2    1.2    1.2    1.1    1.1    0.8    0.5    0.5    0.8    0.8    0.8
  0.8    0.7    0.7    0.7
  40.  *    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.1    0.8    0.6    0.6    0.8    0.8    0.8
  0.8    0.8    0.8    0.8
```

```
 50.  *    1.6    1.5    1.4    1.4    1.4    1.4    1.4    1.4    1.3    1.2    0.9    0.7    0.7    0.8    0.8    0.9
 0.9    0.9    0.9    0.9
 60.  *    1.7    1.6    1.7    1.9    1.9    1.8    1.8    1.7    1.5    1.2    0.8    0.7    0.6    0.6    0.7    0.8
 0.9    0.8    0.8    0.8
 70.  *    1.7    1.7    1.7    1.7    1.7    1.6    1.5    1.6    1.4    0.9    0.5    0.6    0.6    0.4    0.5    0.6
 0.7    0.7    0.6    0.6
 80.  *    1.1    1.1    1.1    1.2    1.2    1.1     1.     1.    0.8    0.7    0.5    0.4    0.4    0.1    0.2    0.3
 0.4    0.4    0.4    0.3
 90.  *    0.6    0.6    0.6    0.6    0.6    0.4    0.5    0.6    0.6    0.4    0.3    0.3    0.3     0.    0.1    0.1
 0.2    0.2    0.2    0.2
100.  *    0.3    0.3    0.3    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.4    0.5    0.5     0.     0.    0.1
0.1    0.1    0.1    0.1
110.  *    0.2    0.2    0.3    0.3    0.4    0.5    0.5    0.5    0.4    0.3    0.3    0.4    0.4     0.     0.    0.1
0.1    0.1    0.1    0.1
120.  *    0.2    0.1    0.2    0.2    0.3    0.3    0.3    0.4    0.4    0.3    0.3    0.3    0.3     0.     0.     0.
0.1    0.1    0.1    0.1
130.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.1    0.3    0.3    0.3    0.3     0.     0.     0.
0.1    0.1     0.     0.
140.  *     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.1    0.1    0.1     0.     0.     0.
0.     0.     0.     0.
150.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1     0.     0.     0.
0.     0.     0.     0.
160.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
0.     0.     0.     0.
170.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1     0.     0.
0.     0.     0.     0.
180.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.3    0.2    0.1
0.     0.     0.     0.
190.  *     0.     0.     0.     0.    0.1     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.3    0.3
0.3    0.2     0.     0.
200.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.    0.4    0.4    0.3
0.4    0.4    0.3    0.2
210.  *    0.2    0.1    0.2    0.2    0.2    0.2    0.2    0.1    0.1     0.     0.     0.     0.    0.5    0.3    0.3
0.4    0.4    0.4    0.4
220.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1     0.     0.     0.    0.4    0.4    0.4
0.3    0.4    0.4    0.3
230.  *    0.4    0.3    0.3    0.4    0.4    0.3    0.3    0.3    0.2    0.1     0.     0.     0.    0.3    0.3    0.4
0.5    0.3    0.3    0.3
240.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.4    0.2    0.1    0.1    0.4    0.4    0.7
0.8    0.8    0.5    0.5
```

250.	*	1.3	1.2	1.2	1.3	1.4	1.3	1.3	1.3	1.1	0.8	0.5	0.4	0.3	0.7	0.8	0.9
0.9	0.8	0.8	0.8														
260.	*	1.7	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.6	1.4	1.	0.8	0.6	1.	0.9	1.
0.9	0.9	1.1	1.1														
270.	*	1.8	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.5	1.2	1.1	0.9	0.7	0.8	1.
0.9	0.8	1.	0.9														
280.	*	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.5	1.3	1.1	1.1	0.9	0.6	0.8	0.7
0.8	0.8	0.9	1.														
290.	*	1.3	1.3	1.3	1.3	1.4	1.3	1.3	1.3	1.3	1.2	1.	0.9	0.9	0.5	0.5	0.7
0.8	0.9	0.9	0.9														
300.	*	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.	0.9	0.9	0.9	0.5	0.8	0.7
0.9	1.	1.	0.9														
310.	*	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.	1.	0.9	0.9	0.8	0.6	0.8	0.9
0.9	0.8	0.8	0.8														
320.	*	1.	1.	1.	1.	1.	1.	1.	1.	1.	0.9	0.9	0.8	0.8	0.9	0.9	0.8
0.8	0.8	0.8	0.8														
330.	*	1.	1.	1.	1.	1.	1.	1.	1.	1.	0.9	1.	0.8	0.8	0.8	0.7	0.7
0.8	0.8	0.8	0.7														
340.	*	1.	1.	1.	1.	1.	1.	1.	1.	1.	0.9	0.9	0.8	0.7	0.8	0.7	0.8
0.8	0.8	0.8	0.7														
350.	*	1.	1.	1.	1.	1.	1.	1.	1.	1.	0.9	1.	0.9	0.8	0.7	0.7	0.8
0.8	0.8	0.7	0.6														
360.	*	1.	1.	1.	1.	1.	1.	1.	1.	1.1	1.	1.	0.8	0.6	0.7	0.7	0.7
0.8	0.7	0.7	0.6														
------	*	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
----------																	
MAX	*	1.8	1.7	1.8	1.9	1.9	1.8	1.8	1.8	1.7	1.5	1.2	1.1	0.9	1.	0.9	1.
0.9	1.	1.1	1.1														
DEGR.	*	270	70	270	60	60	60	60	260	270	270	270	270	270	260	20	260
50	300	260	260														

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88	REC89	REC90	REC91	REC92	REC93	REC94	REC95	REC96	REC97	REC98	REC99	REC100
.	*	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10.	*	0.7	0.7	0.6	0.7	0.7	0.6	0.6	0.6	0.5	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.5	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
30.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.5	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1
40.	*	0.8	0.8	0.8	0.8	0.8	0.7	0.6	0.6	0.4	0.1	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
50.	*	0.8	0.8	0.8	0.8	0.7	0.6	0.5	0.5	0.2	0.1	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
60.	*	0.7	0.7	0.7	0.6	0.5	0.5	0.3	0.3	0.2	0.	0.	0.	0.	0.1	0.1	0.1	0.2	0.2	0.2	0.2
70.	*	0.6	0.4	0.5	0.4	0.4	0.4	0.3	0.3	0.2	0.	0.	0.	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.3
80.	*	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.	0.	0.	0.1	0.1	0.2	0.2	0.2	0.3	0.5	0.5
90.	*	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.	0.	0.	0.1	0.1	0.2	0.2	0.4	0.5	0.5	0.7
100.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.	0.	0.	0.1	0.2	0.2	0.4	0.4	0.7	0.7	0.7
110.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.1	0.2	0.3	0.4	0.6	0.6	0.6	0.6
120.	*	0.1	0.	0.1	0.1	0.	0.1	0.1	0.1	0.1	0.	0.	0.	0.1	0.2	0.4	0.6	0.6	0.6	0.7	0.7
130.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.	0.	0.	0.1	0.2	0.4	0.6	0.6	0.6	0.6	0.6
140.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.	0.	0.	0.	0.2	0.3	0.6	0.6	0.6	0.6	0.6	0.6

```
150.   *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.     0.1    0.5    0.6    0.6
0.6    0.6    0.6    0.6
160.   *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.     0.3    0.5    0.6    0.6
0.6    0.6    0.6    0.6
170.   *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.1    0.3    0.6    0.6    0.6
0.6    0.6    0.6    0.6
180.   *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.2    0.5    0.6    0.7    0.6
0.6    0.6    0.6    0.6
190.   *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.2    0.5    0.7    0.7    0.7
0.7    0.7    0.7    0.6
200.   *    0.1     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.4    0.7    0.7    0.7    0.7
0.7    0.7    0.7    0.7
210.   *    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.5    0.7    0.7    0.7    0.7
0.7    0.7    0.7    0.7
220.   *    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.1    0.7    0.8    0.8    0.8    0.7
0.7    0.7    0.7    0.7
230.   *    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.2    0.8    0.9    0.9    0.9    0.9
0.9    0.9    0.8    0.9
240.   *    0.4    0.4    0.5    0.5    0.4    0.5    0.5    0.6    0.6    0.6    0.6     1.    0.9    0.9    0.9    0.9
0.9    0.9     1.    1.1
250.   *    0.8    0.8    0.9    0.9    0.9    0.8    0.8     1.    1.1     1.    0.9    0.8    0.8    0.8    0.8    0.7
0.8     1.     1.    0.9
260.   *    1.1    1.2    1.2    1.2    1.1    1.1    1.1    1.2    1.2    1.3    1.1    0.6    0.6    0.6    0.6    0.6
0.6    0.6    0.5    0.6
270.   *    0.9     1.    1.1    1.1     1.     1.     1.    1.2    1.2    1.2    1.1    0.2    0.2    0.2    0.2    0.2
0.2    0.2    0.3    0.3
280.   *     1.     1.     1.     1.    0.9    0.9    0.9    1.1     1.     1.    0.9    0.1    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
290.   *    0.9    0.9    0.9    0.8    0.8    0.7    0.7    0.9    0.9    0.9    0.7     0.    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
300.   *    0.9    0.9    0.8    0.8    0.7    0.7    0.7    0.8    0.9    0.9    0.5     0.     0.     0.     0.     0.
0.     0.     0.    0.1
310.   *    0.8    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.3     0.     0.     0.     0.     0.
0.     0.     0.     0.
320.   *    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.2     0.     0.     0.     0.     0.
0.     0.     0.     0.
330.   *    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
340.   *    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.4    0.1     0.     0.     0.     0.     0.
0.     0.     0.     0.
```

```
 350.  *    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.3    0.1     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 360.  *    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.3     0.     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.1    1.2    1.2    1.2    1.1    1.1    1.1    1.2    1.2    1.3    1.1     1.    0.9    0.9    0.9    0.9
 0.9     1.     1.    1.1
 DEGR. *    260    260    260    260    260    260    260    260    260    260    260    240    230    230    230    230
 230    250    240    240
```



```
       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC101 REC102 REC103 REC104 REC105 REC106 REC107 REC108 REC109 REC110 REC111 REC112 REC113 REC114 REC115 REC116
 REC117 REC118 REC119 REC120

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.4    0.3    0.4    0.3    0.3
   0.3    0.4    0.6    0.7
  10.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.4    0.4    0.4    0.3    0.3
  0.6    0.7    0.8    0.8
  20.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.4    0.3    0.4    0.5
  0.7     1.    0.9     1.
  30.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.    0.5    0.4    0.5    0.7    0.8
  1.    0.9     1.    0.8
  40.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.7    0.7    0.8    0.7    0.8
  1.    0.9    0.7    0.8
```

```
 50.  *    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.7    0.9    0.8    0.8    0.9
 0.8    0.7    0.6    0.7
 60.  *    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.9    0.8    0.6    0.6    0.7
 0.7    0.6    0.5    0.6
 70.  *    0.3    0.3    0.4    0.5    0.7    0.7    0.7    0.8    0.8    0.9    0.9    0.5    0.4    0.4    0.5    0.7
 0.5    0.5    0.5    0.6
 80.  *    0.5    0.5    0.5    0.6    0.9    0.9     1.    1.1    1.1    1.2    1.3    0.4    0.3    0.3    0.6    0.6
 0.5    0.5    0.6    0.6
 90.  *    0.7    0.7    0.7    0.7     1.    1.1    1.2    1.3    1.3    1.4    1.4    0.4    0.5    0.4    0.6    0.5
 0.5    0.5    0.6    0.6
100.  *    0.7    0.7    0.7    0.8    1.1    1.2    1.3    1.3    1.3    1.4    1.4    0.5    0.4    0.4    0.5    0.5
0.5    0.5    0.6    0.6
110.  *    0.6    0.7    0.7    0.7     1.    1.1    1.2    1.2    1.2    1.2    1.2    0.3    0.3    0.5    0.5    0.5
0.5    0.7    0.7    0.6
120.  *    0.6    0.6    0.6    0.6     1.    1.1    1.1    1.1    1.1    1.2    1.1    0.3    0.4    0.5    0.5    0.5
0.7    0.7    0.7    0.7
130.  *    0.6    0.6    0.6    0.6     1.    1.1    1.1    1.1    1.1    1.1    1.1    0.4    0.4    0.5    0.5    0.6
0.6    0.6    0.6    0.7
140.  *    0.6    0.6    0.6    0.6    1.1     1.     1.    1.1    1.1    1.1    0.9    0.3    0.4    0.4    0.4    0.6
0.6    0.7    0.7    0.7
150.  *    0.6    0.6    0.6    0.7    1.1     1.     1.     1.     1.    1.1    0.9    0.1    0.1    0.1    0.2    0.2
0.3    0.3    0.3    0.4
160.  *    0.6    0.6    0.6    0.7    1.1    1.1    1.1    1.1    1.1     1.     1.     0.    0.1    0.1    0.1    0.1
0.2    0.2    0.3    0.4
170.  *    0.6    0.6    0.6    0.8    1.1    1.1    1.1    1.1    1.2    1.4     1.     0.    0.     0.     0.    0.1
0.1    0.1    0.1    0.3
180.  *    0.6    0.6    0.6    0.9    1.1     1.    1.2    1.2    1.4    1.3    1.1    0.    0.     0.     0.     0.
0.    0.1    0.1    0.1
190.  *    0.6    0.6    0.6    1.1    1.3    1.4    1.4    1.5    1.4    1.1    0.7    0.    0.     0.     0.     0.
0.     0.     0.    0.1
200.  *    0.7    0.6    0.9    1.2    1.5    1.3    1.3    1.4    1.2     1.    0.4    0.    0.     0.     0.     0.
0.     0.     0.    0.1
210.  *    0.8    0.8    0.9    1.2    1.3    1.3    1.3    1.2    0.9    0.8    0.4    0.    0.     0.     0.     0.
0.     0.     0.     0.
220.  *    0.7    0.7    0.9    1.3    1.3    1.2    1.1    1.1    1.1    0.7    0.6    0.    0.     0.     0.     0.
0.     0.     0.     0.
230.  *     1.    1.2    1.2    1.5    1.6    1.5    1.2    1.3    1.2     1.    0.7    0.    0.     0.     0.     0.
0.     0.     0.     0.
240.  *    1.2    1.4    1.5    1.7    1.6    1.6    1.5    1.4    1.2     1.    0.8    0.    0.     0.     0.     0.
0.     0.     0.     0.
```

```
 250.  *    1.1    1.2    1.3    1.5    1.6    1.2    1.1    1.1    0.9    0.9    0.8    0.3    0.2    0.1    0.1    0.1
 0.1     0.     0.     0.
 260.  *    0.6    0.6    0.6    0.8    0.9    0.7    0.7    0.7    0.5    0.5    0.4    0.6    0.4    0.4    0.3    0.3
 0.2    0.1    0.1    0.1
 270.  *    0.3    0.3    0.3    0.5    0.5    0.2    0.2    0.2    0.3    0.3    0.2    0.8    0.7    0.6    0.4    0.4
 0.3    0.3    0.3    0.2
 280.  *    0.1    0.1    0.1    0.3    0.3    0.3    0.3    0.2    0.4    0.3    0.4    0.9    0.7    0.7    0.6    0.6
 0.5    0.3    0.3    0.3
 290.  *    0.1    0.1    0.1    0.3    0.3    0.2    0.2    0.2    0.2    0.3    0.3    0.8    0.7    0.6    0.6    0.6
 0.4    0.4    0.4    0.3
 300.  *    0.1    0.1    0.1    0.1    0.2    0.1    0.2    0.2    0.2    0.2    0.3    0.8    0.7    0.7    0.6    0.4
 0.4    0.4    0.4    0.5
 310.  *     0.     0.     0.     0.     0.     0.     0.    0.2    0.2    0.2    0.2    0.7    0.7    0.7    0.5    0.5
 0.4    0.4    0.4    0.4
 320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.2    0.2    0.7    0.7    0.5    0.5    0.5
 0.4    0.3    0.4    0.4
 330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.7    0.5    0.5    0.5    0.5
 0.3    0.2    0.2    0.3
 340.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.5    0.6    0.4    0.3    0.3
 0.5    0.3    0.4    0.5
 350.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.6    0.4    0.3    0.4    0.4
 0.4    0.5    0.3    0.6
 360.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.4    0.3    0.4    0.3    0.3
 0.3    0.4    0.6    0.7

 ------*-----------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *    1.2    1.4    1.5    1.7    1.6    1.6    1.5    1.5    1.4    1.4    1.4    0.9    0.9    0.8    0.8    0.9
 1.     1.     1.     1.
 DEGR. *    240    240    240    240    230    240    240    190    180     90     90     60     50     40     50     50
 30     20     30     20
```

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND * CONCENTRATION
ANGLE * (PPM)
(DEGR)* REC121 REC122 REC123 REC124 REC125 REC126 REC127 REC128 REC129 REC130 REC131 REC132 REC133 REC134 REC135 REC136 REC137 REC138 REC139 REC140

.	*	0.7	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.4	0.4	0.4	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.9
10.	*	1.	1.	1.1	1.	1.	1.	1.	1.	0.9	0.1	0.2	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.7
20.	*	1.	1.1	1.	1.	1.1	1.	1.	0.9	0.8	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.6	0.6
30.	*	0.9	0.9	0.9	0.9	1.	1.	0.9	0.8	0.5	0.	0.	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.5	0.5
40.	*	0.8	0.7	0.8	0.8	0.7	0.6	0.6	0.5	0.3	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1	0.3	0.3
50.	*	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.3	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1
60.	*	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.3	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
70.	*	0.6	0.6	0.6	0.6	0.6	0.6	0.3	0.3	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
80.	*	0.6	0.6	0.6	0.6	0.6	0.5	0.3	0.3	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90.	*	0.6	0.6	0.6	0.6	0.6	0.3	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100.	*	0.6	0.6	0.6	0.6	0.5	0.3	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
110.	*	0.6	0.6	0.6	0.7	0.4	0.3	0.2	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2
120.	*	0.7	0.7	0.6	0.4	0.4	0.3	0.3	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.2	0.2
130.	*	0.7	0.6	0.4	0.4	0.3	0.3	0.2	0.2	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.2	0.2	0.3
140.	*	0.7	0.5	0.4	0.3	0.3	0.3	0.2	0.1	0.	0.	0.	0.	0.1	0.3	0.3	0.3	0.4	0.4	0.5	0.5

150.	*	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.1	0.	0.	0.1	0.2	0.3	0.3	0.4	0.5	
0.6	0.7	0.8	0.9															
160.	*	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.	0.	0.1	0.2	0.3	0.4	0.7	0.8	
1.1	1.2	1.3	1.3															
170.	*	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.	0.	0.1	0.2	0.4	0.7	1.	1.3	
1.5	1.6	1.6	1.8															
180.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.1	0.2	0.4	0.8	1.3	1.4	
1.6	1.7	1.7	1.7															
190.	*	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.1	0.2	0.6	0.9	1.2	1.4	
1.5	1.6	1.6	1.6															
200.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.3	0.6	1.	1.1	1.2	
1.4	1.4	1.4	1.4															
210.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.3	0.6	1.	1.	1.	
1.	1.	1.	1.															
220.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.3	0.7	1.1	1.	1.	
1.	1.	1.	0.9															
230.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.3	0.7	0.9	0.9	0.9	
0.9	0.9	0.9	0.9															
240.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.3	0.8	0.9	0.9	0.9	
0.9	0.9	0.9	0.9															
250.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2	0.3	0.4	0.8	0.9	1.	0.9	
0.9	0.9	0.9	0.9															
260.	*	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.2	0.3	0.5	0.9	0.9	0.9	1.	
1.	1.	1.	1.															
270.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.3	0.5	0.6	1.	1.	1.	1.	
1.	1.1	1.2	1.2															
280.	*	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.5	0.9	1.1	1.1	1.2	1.3	
1.3	1.3	1.2	1.2															
290.	*	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.4	0.5	1.	1.3	1.3	1.3	1.4	
1.4	1.3	1.4	1.4															
300.	*	0.5	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.6	0.8	1.2	1.4	1.4	1.4	1.5	
1.4	1.4	1.4	1.5															
310.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	1.	1.1	1.6	1.7	1.7	1.7	1.6	
1.6	1.5	1.6	1.7															
320.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	1.	1.3	1.7	1.7	1.7	1.6	1.5	
1.6	1.7	1.7	1.7															
330.	*	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.9	1.3	1.6	1.6	1.6	1.7	1.9	
1.8	1.7	1.8	1.8															
340.	*	0.4	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.9	1.1	1.2	1.2	1.2	1.3	1.4	
1.5	1.5	1.4	1.4															

```
 350.  *    0.7    0.7    0.7    0.5    0.6    0.7    0.7    0.7    0.7    0.5    0.6    0.8    0.8    0.8    0.9    0.9
 0.8    0.9     1.    1.1
 360.  *    0.7    0.8    0.8    0.8    0.8    0.8    0.9    0.9    0.9    0.4    0.4    0.4    0.5    0.6    0.6    0.7
 0.7    0.8    0.8    0.9

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *     1.    1.1    1.1     1.    1.1     1.     1.     1.    0.9     1.    1.3    1.7    1.7    1.7    1.7    1.9
 1.8    1.7    1.8    1.8
 DEGR. *     10     20     10     10     20     10     10     10      0    310    320    320    310    310    310    330
 330    180    330    170
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC141	REC142	REC143	REC144	REC145	REC146
.	0.6	0.5	0.6	0.7	0.8	0.7
10.	0.6	0.5	0.5	0.6	0.7	0.8
20.	0.4	0.4	0.6	0.6	0.6	0.8
30.	0.4	0.5	0.5	0.6	0.7	0.6
40.	0.4	0.4	0.4	0.4	0.7	0.7
50.	0.2	0.2	0.4	0.4	0.5	0.6
60.	0.1	0.1	0.1	0.3	0.3	0.5
70.	0.	0.	0.	0.1	0.1	0.2
80.	0.	0.	0.	0.	0.	0.1
90.	0.	0.	0.	0.	0.	0.
100.	0.	0.	0.	0.	0.	0.
110.	0.	0.	0.	0.	0.	0.
120.	0.	0.	0.	0.	0.	0.

130.	*	0.1	0.	0.	0.	0.	0.
140.	*	0.2	0.1	0.	0.	0.	0.
150.	*	0.5	0.2	0.2	0.	0.	0.
160.	*	1.	0.7	0.5	0.3	0.1	0.
170.	*	1.4	1.	0.9	0.6	0.4	0.2
180.	*	1.5	1.3	1.	0.8	0.7	0.5
190.	*	1.3	1.	0.8	0.8	0.8	0.6
200.	*	1.1	1.	0.8	0.8	0.8	0.6
210.	*	1.	0.9	0.8	0.8	0.7	0.5
220.	*	1.	0.8	0.8	0.8	0.7	0.5
230.	*	0.9	0.8	0.9	0.7	0.5	0.5
240.	*	0.9	0.8	0.8	0.6	0.5	0.5
250.	*	0.9	0.9	0.9	0.7	0.7	0.7
260.	*	1.1	1.2	1.1	1.	0.8	0.9
270.	*	1.2	1.3	1.1	1.	1.	0.9
280.	*	1.4	1.4	1.	1.	0.9	0.6
290.	*	1.5	1.3	1.	0.9	0.7	0.3
300.	*	1.6	1.3	0.9	0.5	0.3	0.5
310.	*	1.2	0.9	0.6	0.5	0.6	0.5
320.	*	1.2	1.	0.6	0.5	0.5	0.6
330.	*	1.1	0.8	0.4	0.4	0.4	0.5
340.	*	0.9	0.5	0.2	0.4	0.4	0.6
350.	*	0.8	0.5	0.4	0.5	0.7	0.7
360.	*	0.6	0.5	0.6	0.7	0.8	0.7
MAX	*	1.6	1.4	1.1	1.	1.	0.9
DEGR.	*	300	280	260	260	270	260

THE HIGHEST CONCENTRATION OF 1.90 ppm OCCURRED AT RECEPTOR REC64.

FF

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*********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/6/2012 2:10:24 PM
** File: F:\2975 FirstLight\Microscale\Worst\34 Dean Longmeadow & Owen LOS&ADT\2022APM.ou2
**
*********************************************
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 A PM RUN: CAL3QHC RUN

DATE : 12/ 6/12
TIME : 14:10:22

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE
VPH EF H W V/C QUEUE	*	X1	Y1	X2	Y2	*	(M)		
	*	(DEG)	(G/MI)	(M)	(M)	(VEH)			
1. Dean EB LL	*	235106.84	850497.38	235156.62	850512.50	*	52.	73.	AG
11. 8.5 0.0 9.0									
2. Dean EB LL QUEUE	*	235156.62	850512.50	235153.28	850511.50	*	3.	253.	AG
116. 100.0 0.0 3.0 0.73 0.6									
3. Dean EB TR	*	235066.06	850482.19	235155.91	850506.75	*	93.	75.	AG

```
 1057.   8.5   0.0   13.4
 4. Dean EB TR QUEUE                    *  235155.91    850506.75   234893.69    850435.06 *     272.   255. AG
 172. 100.0   0.0    7.4 1.11  45.3
 5. Dean WB LL                          *  235225.55    850536.69   235185.14    850524.44 *      42.   253. AG
 397.   8.5   0.0    9.4
 6. Dean WB LL QUEUE                    *  235185.14    850524.44   235743.81    850693.81 *     584.    73. AG
 102. 100.0   0.0    3.4 1.68  97.3
 7. Dean WB TR                          *  235275.70    850557.25   235185.14    850530.19 *      95.   253. AG
 1165.   8.5   0.0   13.4
 8. Dean WB TR QUEUE                    *  235185.14    850530.19   235241.83    850547.12 *      59.    73. AG
 125. 100.0   0.0    7.4 0.69   9.9
 9. Owen NB LL                          *  235207.16    850428.06   235179.00    850508.50 *      85.   341. AG
 29.   8.5   0.0    9.7
10. Owen NB LL QUEUE                    *  235179.00    850508.50   235180.44    850504.38 *       4.   161. AG
92. 100.0   0.0    3.7 0.08   0.7
11. Owen NB T                           *  235208.59    850429.88   235181.17    850508.88 *      84.   341. AG
302.   8.5   0.0    9.7
12. Owen NB T QUEUE                     *  235181.17    850508.88   235181.17    850508.88 *       0.    90.
AG      0. 100.0   0.0    3.7 0.17   0.0
13. Owen NB R                           *  235207.52    850436.38   235189.47    850493.75 *      60.   343. AG
315.   8.5   0.0    9.7
14. Owen NB R QUEUE                     *  235189.47    850493.75   235205.23    850443.62 *      53.   163. AG
92. 100.0   0.0    3.7 0.83   8.8
15. Longmeadow SB L                     *  235147.36    850577.25   235162.05    850535.25 *      44.   161. AG
149.   8.5   0.0    9.0
16. Longmeadow SB L QUEUE               *  235162.05    850535.25   235154.78    850556.38 *      22.   341. AG
92. 100.0   0.0    3.0 0.39   3.7
17. Longmeadow SB TR                    *  235134.16    850612.38   235159.88    850533.06 *      83.   162. AG
396.   8.5   0.0    9.0
18. Longmeadow SB TR QUEUE              *  235159.88    850533.06   235116.36    850666.69 *     141.   342. AG
92. 100.0   0.0    3.0 1.04  23.4
19. Dean EB OUTBOUND                    *  235195.64    850518.06   235273.02    850547.94 *      83.    69. AG
1345.   8.5   0.0   13.4
20. Dean WB OUTBOUND                    *  235156.41    850522.00   235064.98    850493.25 *      96.   253. AG
965.   8.5   0.0   13.4
21. Longmeadow NB OUTBOUND              *  235170.09    850535.00   235137.33    850611.62 *      83.   337. AG
561.   8.5   0.0    9.0
22. Owen SB OUTBOUND                    *  235175.48    850492.88   235201.41    850426.62 *      71.   159. AG
950.   8.5   0.0    9.7
23. EBL                                 *  235157.16    850512.56   235169.77    850534.62 *      25.    30. AG
```

```
11.   9.4   0.0    9.0
24. EBT                          *  235156.48    850506.94   235194.47    850517.81 *      40.     74. AG
881.   8.5   0.0   12.0
25. EBR                          *  235146.28    850504.06   235174.59    850494.12 *      30.    109. AG
176.  10.3   0.0    9.0
26. WBL                          *  235183.81    850524.38   235172.95    850497.75 *      29.    202. AG
397.   9.4   0.0    9.0
27. WBT                          *  235184.27    850530.12   235156.48    850522.06 *      29.    254. AG
917.   8.5   0.0   12.0
28. WBR                          *  235184.27    850529.44   235168.45    850535.38 *      17.    291. AG
248.  10.3   0.0    9.0
29. NBL                          *  235178.67    850509.50   235156.05    850521.88 *      26.    299. AG
29.   9.4   0.0    9.0
30. NBT                          *  235180.75    850510.00   235170.09    850534.50 *      27.    336. AG
302.   8.5   0.0    9.0
31. NBR                          *  235188.33    850495.06   235198.97    850518.94 *      26.     24. AG
315.  10.3   0.0    9.0
32. SBL                          *  235162.09    850534.69   235188.55    850516.94 *      32.    124. AG
149.   9.4   0.0    9.0
33. SBT                          *  235159.89    850532.50   235173.73    850497.75 *      37.    158. AG
377.   8.5   0.0    9.0
34. SBR                          *  235160.44    850532.31   235155.61    850521.56 *      12.    204. AG
19.  10.3   0.0    9.0
```


JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 A PM RUN: CAL3QHC
RUN

DATE : 12/ 6/12
TIME : 14:10:22

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	* CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Dean EB LL QUEUE	* 120	113	4.0	11	1900	45.89	3	3

4. Dean EB TR QUEUE	*	120	84	4.0	1057	1900	45.89	3	3
6. Dean WB LL QUEUE	*	120	99	4.0	397	1900	45.89	3	3
8. Dean WB TR QUEUE	*	120	61	4.0	1165	1900	45.89	3	3
10. Owen NB LL QUEUE	*	120	90	4.0	29	1900	45.89	3	3
12. Owen NB T QUEUE	*	120	0	4.0	302	1900	45.89	3	3
14. Owen NB R QUEUE	*	120	90	4.0	315	1900	45.89	3	3
16. Longmeadow SB L QUEUE	*	120	90	4.0	149	1900	45.89	3	3
18. Longmeadow SB TR QUEUE	*	120	90	4.0	396	1900	45.89	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235178.36	850537.06	1.8	*
2. LR_2	*	235171.39	850540.94	1.8	*
3. LR_3	*	235169.19	850544.88	1.8	*
4. LR_4	*	235166.98	850548.81	1.8	*
5. LR_5	*	235163.70	850553.81	1.8	*
6. LR_6	*	235161.97	850558.50	1.8	*
7. LR_7	*	235160.23	850563.19	1.8	*
8. LR_8	*	235158.48	850567.88	1.8	*
9. LR_9	*	235156.75	850572.56	1.8	*
10. LR_10	*	235155.02	850577.25	1.8	*
11. LR_11	*	235153.27	850581.94	1.8	*
12. LR_12	*	235151.53	850586.62	1.8	*
13. LR_13	*	235149.80	850591.31	1.8	*
14. LR_14	*	235148.05	850596.00	1.8	*
15. LR_15	*	235146.31	850600.69	1.8	*
16. LR_16	*	235144.56	850605.38	1.8	*
17. LR_17	*	235142.83	850610.06	1.8	*
18. LR_18	*	235130.50	850610.00	1.8	*
19. LR_19	*	235132.23	850605.31	1.8	*
20. LR_20	*	235133.98	850600.62	1.8	*
21. LR_21	*	235135.72	850595.94	1.8	*
22. LR_22	*	235137.45	850591.25	1.8	*
23. LR_23	*	235139.20	850586.56	1.8	*
24. LR_24	*	235140.94	850581.88	1.8	*
25. LR_25	*	235142.69	850577.19	1.8	*

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 A PM RUN: CAL3QHC RUN

RECEPTOR	COORDINATES (M) X	Y	Z
26. LR_26	235144.42	850572.50	1.8
27. LR_27	235146.16	850567.81	1.8
28. LR_28	235147.91	850563.12	1.8
29. LR_29	235149.64	850558.44	1.8
30. LR_30	235151.38	850553.75	1.8
31. LR_31	235153.12	850549.06	1.8
32. LR_32	235154.86	850544.38	1.8
33. LR_33	235154.91	850539.38	1.8
34. LR_34	235156.66	850534.69	1.8
35. LR_35	235153.22	850528.19	1.8
36. LR_36	235149.31	850523.50	1.8
37. LR_37	235144.55	850522.06	1.8
38. LR_38	235139.75	850520.56	1.8
39. LR_39	235134.97	850519.12	1.8
40. LR_40	235130.19	850517.69	1.8
41. LR_41	235125.41	850516.25	1.8
42. LR_42	235120.62	850514.75	1.8
43. LR_43	235115.83	850513.31	1.8
44. LR_44	235111.05	850511.88	1.8
45. LR_45	235106.27	850510.38	1.8
46. LR_46	235101.48	850508.94	1.8
47. LR_47	235096.70	850507.50	1.8
48. LR_48	235091.92	850506.00	1.8
49. LR_49	235087.12	850504.56	1.8
50. LR_50	235082.34	850503.12	1.8
51. LR_51	235077.56	850501.69	1.8
52. LR_52	235072.78	850500.19	1.8
53. LR_53	235068.00	850498.75	1.8
54. LR_54	235063.20	850497.31	1.8
55. LR_55	235073.41	850479.50	1.8
56. LR_56	235078.19	850480.94	1.8
57. LR_57	235082.97	850482.38	1.8
58. LR_58	235087.75	850483.81	1.8
59. LR_59	235092.55	850485.31	1.8

60. LR_60	*	235097.31	850486.75	1.8	*
61. LR_61	*	235102.09	850488.19	1.8	*
62. LR_62	*	235107.00	850489.25	1.8	*
63. LR_63	*	235111.78	850490.69	1.8	*
64. LR_64	*	235116.56	850492.12	1.8	*
65. LR_65	*	235121.34	850493.56	1.8	*
66. LR_66	*	235126.88	850494.75	1.8	*
67. LR_67	*	235131.12	850496.00	1.8	*
68. LR_68	*	235135.80	850497.12	1.8	*
69. LR_69	*	235140.27	850497.81	1.8	*
70. LR_70	*	235145.27	850497.75	1.8	*
71. LR_71	*	235149.83	850496.81	1.8	*
72. LR_72	*	235153.11	850496.06	1.8	*
73. LR_73	*	235156.19	850495.12	1.8	*
74. LR_75	*	235202.16	850511.88	1.8	*
75. LR_76	*	235204.62	850514.00	1.8	*
76. LR_77	*	235207.84	850516.75	1.8	*
77. LR_79	*	235212.31	850520.25	1.8	*
78. LR_80	*	235217.08	850521.75	1.8	*

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 A PM RUN: CAL3QHC
RUN

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
79. LR_81	*	235221.84	850523.25	1.8	*
80. LR_82	*	235226.45	850524.75	1.8	*
81. LR_83	*	235231.23	850526.25	1.8	*
82. LR_84	*	235236.00	850527.75	1.8	*
83. LR_85	*	235240.45	850530.38	1.8	*
84. LR_86	*	235245.23	850531.88	1.8	*
85. LR_87	*	235249.98	850533.38	1.8	*
86. LR_88	*	235254.45	850535.50	1.8	*
87. LR_89	*	235259.22	850537.00	1.8	*
88. LR_90	*	235263.38	850541.00	1.8	*
89. LR_91	*	235268.14	850542.50	1.8	*
90. LR_92	*	235272.91	850544.00	1.8	*
91. LR_93	*	235277.69	850545.50	1.8	*
92. LR_94	*	235275.39	850561.56	1.8	*

93.	LR_95	*	235270.62	850560.06	1.8 *
94.	LR_96	*	235265.86	850558.56	1.8 *
95.	LR_97	*	235261.09	850557.00	1.8 *
96.	LR_98	*	235256.31	850555.50	1.8 *
97.	LR_99	*	235251.56	850554.00	1.8 *
98.	LR_100	*	235246.80	850552.50	1.8 *
99.	LR_101	*	235242.02	850551.00	1.8 *
**.	LR_102	*	235237.27	850549.50	1.8 *
**.	LR_103	*	235232.48	850548.00	1.8 *
**.	LR_104	*	235227.72	850546.50	1.8 *
**.	LR_105	*	235222.95	850545.00	1.8 *
**.	LR_106	*	235218.19	850543.44	1.8 *
**.	LR_107	*	235213.42	850541.94	1.8 *
**.	LR_108	*	235208.66	850541.38	1.8 *
**.	LR_109	*	235202.81	850539.88	1.8 *
**.	LR_110	*	235198.05	850538.38	1.8 *
**.	LR_111	*	235194.19	850537.31	1.8 *
**.	LR_112	*	235189.44	850535.81	1.8 *
**.	LR_113	*	235184.66	850534.31	1.8 *
**.	LR_114	*	235159.12	850493.88	1.8 *
**.	LR_115	*	235161.91	850492.31	1.8 *
**.	LR_116	*	235165.55	850490.00	1.8 *
**.	LR_117	*	235168.09	850487.94	1.8 *
**.	LR_118	*	235170.88	850485.00	1.8 *
**.	LR_119	*	235173.97	850481.00	1.8 *
**.	LR_120	*	235176.31	850476.75	1.8 *
**.	LR_121	*	235178.02	850473.00	1.8 *
**.	LR_122	*	235181.77	850468.19	1.8 *
**.	LR_123	*	235183.45	850463.50	1.8 *
**.	LR_124	*	235185.16	850458.81	1.8 *
**.	LR_125	*	235186.86	850454.12	1.8 *
**.	LR_126	*	235188.56	850449.38	1.8 *
**.	LR_127	*	235190.27	850444.69	1.8 *
**.	LR_128	*	235191.95	850440.00	1.8 *
**.	LR_129	*	235193.66	850435.31	1.8 *
**.	LR_130	*	235195.36	850430.56	1.8 *
**.	LR_131	*	235197.06	850425.88	1.8 *
**.	LR_132	*	235211.48	850433.06	1.8 *
**.	LR_133	*	235209.78	850437.75	1.8 *

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 A PM RUN: CAL3QHC
RUN

RECEPTOR	X	Y	Z
**. LR_134	235208.08	850442.50	1.8
**. LR_135	235206.38	850447.19	1.8
**. LR_136	235204.69	850451.88	1.8
**. LR_137	235202.98	850456.56	1.8
**. LR_138	235201.28	850461.25	1.8
**. LR_139	235199.58	850466.00	1.8
**. LR_140	235197.88	850470.69	1.8
**. LR_141	235196.19	850475.38	1.8
**. LR_142	235194.48	850480.06	1.8
**. LR_143	235194.25	850485.06	1.8
**. LR_144	235194.02	850489.75	1.8
**. LR_145	235194.09	850494.19	1.8
**. LR_146	235194.45	850498.88	1.8
**. LR_147	235195.98	850503.62	1.8
**. LR_148	235199.00	850508.31	1.8

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	0.	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.				

```
    0.    0.4    0.5    0.6
 10.  *     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.
 0.    0.3    0.5    0.6
 20.  *     0.     0.     0.     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.3    0.4    0.5
 30.  *     0.     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.3    0.5    0.5
 40.  *     0.     0.     0.     0.    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.3    0.5    0.5
 50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.3    0.5    0.5
 60.  *    0.1     0.     0.     0.    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.4    0.5    0.5
 70.  *    0.4    0.2    0.1    0.1    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.3    0.5    0.5
 80.  *     1.    0.6    0.4    0.2    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.
 0.    0.5    0.5    0.5
 90.  *    1.3    0.8    0.7    0.5    0.5    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1
 0.1    0.6    0.6    0.6
100.  *    1.3     1.    0.7    0.6    0.6    0.4    0.4    0.4    0.3    0.2    0.2    0.1    0.1    0.1    0.1    0.1
0.1    0.6    0.7    0.6
110.  *    1.1    0.8    0.7    0.6    0.7    0.5    0.5    0.4    0.4    0.4    0.4    0.3    0.2    0.2    0.1    0.1
0.1    0.6    0.7    0.8
120.  *    1.1    0.8    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.4    0.4    0.3    0.3
0.3    0.8    0.9     1.
130.  *    0.9    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.3
0.3     1.     1.    1.1
140.  *    0.8    0.6    0.7    0.7    0.7    0.6    0.6    0.6    0.6    0.5    0.4    0.4    0.4    0.4    0.4    0.4
0.4    0.8    0.8    0.8
150.  *    0.7    0.6    0.4    0.4    0.4    0.4    0.4    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2
0.2    0.8    0.8    0.8
160.  *    0.7    0.9    0.8    0.7    0.7    0.6    0.6    0.7    0.6    0.5    0.5    0.4    0.4    0.4    0.5    0.5
0.5    0.6    0.6    0.6
170.  *    0.8    0.9    0.7    0.5    0.6    0.7    0.8    0.8    0.7    0.7    0.6    0.6    0.6    0.6    0.6    0.6
0.6    0.3    0.4    0.4

------*-------------------------------------------------------------------------------------------------------------
--------------------
MAX   *    1.3     1.    0.8    0.7    0.7    0.7    0.8    0.8    0.7    0.7    0.6    0.6    0.6    0.6    0.6    0.6
0.6     1.     1.    1.1
```

DEGR. * 90 100 160 140 110 170 170 170 170 170 170 170 170 170 170 170
170 130 130 130

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
	* REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16
	REC17	REC18	REC19	REC20												
180.	* 0.7	0.8	0.6	0.5	0.6	0.7	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7
	0.7	0.2	0.3	0.3												
190.	* 0.7	0.7	0.5	0.7	0.9	0.9	1.	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8
	0.8	0.3	0.3	0.3												
200.	* 0.6	0.8	0.6	0.8	0.9	1.	1.	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	0.7	0.1	0.2	0.2												
210.	* 0.9	0.9	0.8	0.9	1.	1.1	1.	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.6
	0.6	0.1	0.1	0.1												
220.	* 1.1	0.7	0.8	1.	1.	1.	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.6
	0.6	0.1	0.1	0.1												
230.	* 1.	0.9	1.	1.	1.	1.	0.8	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	0.6	0.1	0.1	0.1												
240.	* 1.	1.	1.	0.9	0.8	0.7	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.5
	0.5	0.	0.	0.												
250.	* 0.7	0.8	0.8	0.7	0.7	0.6	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5
	0.5	0.	0.	0.												
260.	* 0.5	0.7	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5
	0.5	0.	0.	0.												
270.	* 0.4	0.5	0.5	0.6	0.5	0.3	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

```
0.4     0.     0.     0.
280.  *    0.4    0.6    0.6    0.6    0.5    0.4    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5
0.4     0.     0.     0.
290.  *    0.4    0.5    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5
0.3     0.     0.     0.
300.  *    0.5    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5
0.3     0.     0.     0.
310.  *    0.5    0.7    0.7    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.5    0.5    0.4
0.3     0.     0.     0.
320.  *    0.4    0.7    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.5    0.3
0.3     0.     0.     0.
330.  *    0.2    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.4    0.4    0.3
0.2    0.1    0.1    0.2
340.  *    0.2    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.2    0.2
0.1    0.2    0.3    0.3
350.  *     0.    0.2    0.2    0.2    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.2     0.
0.    0.3    0.4    0.5
360.  *     0.    0.1    0.1    0.1    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.
0.    0.4    0.5    0.6

------*-------------------------------------------------------------------------------------------------------------------
--------------------
MAX   *    1.3     1.     1.     1.     1.    1.1     1.    0.9    0.9    0.9    0.8    0.8    0.8    0.8    0.8    0.8
0.8     1.     1.    1.1
DEGR. *     90    100    230    220    210    210    190    190    190    190    180    180    190    190    190    190
190    130    130    130

      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
```

```
 REC37  REC38  REC39  REC40

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.7    0.7    0.8    0.8    0.8    0.8    0.9    0.9    1.1    1.1    1.2    1.3    1.1    1.1    0.6    0.4
    0.3    0.1    0.1    0.1

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.7    0.7    0.8    0.8    0.8    0.8    0.9    0.9    1.1    1.1    1.2    1.3    1.1    1.1    0.6    0.4
 0.3    0.1    0.1    0.1
 DEGR. *      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
 0      0      0      0
```



```
       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
 REC37  REC38  REC39  REC40

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
  10.  *    0.7    0.7    0.7    0.7    0.9    0.9    0.9    0.9    0.9     1.    1.1    1.3     1.    1.1    0.5    0.5
  0.3    0.3    0.1    0.1
  20.  *    0.6    0.7    0.7    0.7    0.7    0.7    0.6    0.7    0.8    0.8     1.    1.1     1.    1.1    0.6    0.5
  0.5    0.4    0.3    0.2
  30.  *    0.5    0.5    0.5    0.5    0.6    0.6    0.6    0.6    0.7    0.7    0.9     1.    0.7    0.8    0.5    0.5
  0.5    0.5    0.3    0.2
  40.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.7    0.9    0.9    0.7    0.7    0.4    0.4
  0.4    0.4    0.4    0.3
```

50.	*	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.8	0.8	0.7	0.7	0.4	0.5	
0.3		0.4	0.4	0.4														
60.	*	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.7	0.8	0.7	0.7	0.5	0.6	
0.6		0.6	0.4	0.4														
70.	*	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.8	0.9	0.9	1.	0.7	1.1	
0.9		0.8	0.8	0.8														
80.	*	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.8	1.	1.1	1.2	1.3	1.	1.3	
1.1		1.	0.9	1.1														
90.	*	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	1.1	1.2	1.3	1.4	1.3	1.2	1.1	
1.		0.9	1.	1.														
100.	*	0.6	0.6	0.6	0.7	0.7	0.8	0.9	0.9	1.	1.3	1.4	1.5	1.4	0.9	0.9	0.8	
0.7		0.6	0.7	0.7														
110.	*	0.8	0.9	0.9	0.9	0.9	1.1	1.1	1.1	1.2	1.4	1.4	1.4	1.2	1.3	0.6	0.6	
0.6		0.4	0.6	0.6														
120.	*	1.	1.	1.1	1.1	1.1	1.2	1.1	1.2	1.3	1.5	1.6	1.5	0.8	1.	0.4	0.6	
0.5		0.6	0.7	0.7														
130.	*	1.1	1.1	1.1	1.2	1.3	1.3	1.4	1.4	1.6	1.6	1.4	1.3	0.9	0.6	0.5	0.6	
0.7		0.8	0.8	0.9														
140.	*	0.8	0.8	0.8	0.8	1.	1.	1.1	1.2	1.5	1.5	1.4	1.1	0.8	0.6	0.7	0.5	
0.7		0.6	0.8	0.8														
150.	*	0.7	0.7	0.8	0.8	1.1	1.1	1.2	1.4	1.3	1.4	1.5	1.3	0.8	0.7	0.6	0.7	
0.6		0.8	0.7	0.7														
160.	*	0.6	0.6	0.7	0.7	0.8	0.9	1.	1.1	1.2	1.2	1.2	1.1	0.6	0.5	0.5	0.8	
0.6		0.7	0.7	0.7														
170.	*	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.8	0.8	0.8	1.	1.	0.7	0.5	0.5	0.5	
0.7		0.7	0.7	0.7														
180.	*	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.7	0.5	0.6	0.5	0.7	
0.7		0.7	0.7	0.7														
190.	*	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.8	
0.8		0.8	0.8	0.8														
200.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.5	0.6	0.6	0.5	0.5	0.8	0.8	
0.8		0.8	0.8	0.8														
210.	*	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.7	0.5	0.5	0.8	0.8	
0.8		0.8	0.8	0.8														
220.	*	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.7	0.9	0.9	
0.9		0.9	0.9	0.9														
230.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.5	0.6	0.7	0.9	1.	
1.1		1.1	1.	1.														
240.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.4	0.5	0.6	0.8	1.1	
1.1		1.1	1.1	1.														

```
 250.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.2    0.3    0.4    0.7    0.9
 0.9    0.9    0.9    0.9
 260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.3    0.5
 0.5    0.5    0.5    0.5
 270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.3
 0.3    0.3    0.3    0.3
 280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2
 0.1    0.1    0.1    0.1
 290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.2    0.     0.     0.     0.1
 0.1    0.1    0.1    0.1
 310.  *     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.2    0.2    0.2    0.     0.1    0.     0.1
 0.1    0.1    0.1    0.1
 320.  *     0.    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.2    0.2    0.     0.1
 0.     0.     0.     0.
 330.  *    0.2    0.2    0.2    0.3    0.3    0.3    0.4    0.5    0.5    0.6    0.6    0.7    0.4    0.4    0.     0.1
 0.     0.     0.     0.
 340.  *    0.4    0.4    0.5    0.5    0.7    0.7    0.7    0.8    0.9    0.9    1.1    1.3    0.7    0.8    0.2    0.2
 0.     0.     0.     0.
 350.  *    0.5    0.7    0.7    0.8    0.8    0.8    0.9    0.9    1.1    1.1    1.2    1.3     1.     1.    0.4    0.2
 0.1    0.1    0.1     0.
 360.  *    0.7    0.7    0.8    0.8    0.8    0.8    0.9    0.9    1.1    1.1    1.2    1.3    1.1    1.1    0.6    0.4
 0.3    0.1    0.1    0.1

 ------*-----------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *    1.1    1.1    1.1    1.2    1.3    1.3    1.4    1.4    1.6    1.6    1.6    1.5    1.4    1.3    1.2    1.3
 1.1    1.1    1.1    1.1
 DEGR. *    130    130    120    130    130    130    130    130    130    130    120    100     90     80     90     80
 80    230    240     80
```

FF

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	*	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.1	1.1	1.1	1.1	1.1	1.1
10.	*	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.1	1.1	1.1	1.1	1.1	1.1
20.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.	0.	1.1	1.1	1.1	1.2	1.2	1.3
30.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	1.2	1.2	1.2	1.2	1.2	1.3
40.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.4	1.4	1.4	1.4	1.4	1.4
50.	*	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.6	1.6	1.6	1.6	1.6	1.7
60.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	1.8	1.8	1.8	1.8	1.9	1.9
70.	*	0.9	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.8	0.8	0.7	0.7	1.9	1.9	1.9	1.9	1.9	2.
80.	*	1.	1.	1.	1.1	1.	1.1	1.1	1.1	1.	1.	1.1	1.1	1.	0.9	1.1	1.1	1.2	1.2	1.2	1.3
90.	*	0.9	1.	0.9	0.9	1.1	1.1	0.8	0.9	1.	1.	1.	1.	1.	1.	0.5	0.5	0.5	0.6	0.6	0.6
100.	*	0.7	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.	1.	1.	1.	0.2	0.2	0.3	0.3	0.3	0.4
110.	*	0.7	0.7	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.	1.	1.	1.	0.9	0.1	0.1	0.1	0.1	0.2	0.2
120.	*	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.1	0.1	0.1	0.1	0.1	0.2
130.	*	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.	0.1	0.1	0.1	0.1	0.1
140.	*	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.	0.	0.	0.	0.	0.

150.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.7	0.	0.	
0.	0.	0.	0.															
160.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.	0.	
0.	0.	0.	0.															
170.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.	0.	
0.	0.	0.	0.															
180.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.6	0.3	0.	0.	
0.	0.	0.	0.															
190.	*	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.6	0.3	0.	0.	
0.	0.	0.	0.															
200.	*	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.5	0.3	0.	0.	
0.1	0.1	0.1	0.1															
210.	*	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.5	0.3	0.	0.1	
0.1	0.1	0.1	0.2															
220.	*	1.	1.	1.	1.	1.	1.	1.	1.	0.9	0.9	0.8	0.7	0.6	0.4	0.	0.1	
0.1	0.2	0.2	0.2															
230.	*	1.	1.	1.	1.	1.	1.	0.9	0.9	0.9	0.8	0.7	0.6	0.5	0.4	0.2	0.2	
0.2	0.2	0.3	0.3															
240.	*	1.	1.	1.	1.	1.	0.9	0.9	0.9	0.8	0.7	0.7	0.6	0.5	0.4	0.4	0.5	
0.5	0.5	0.6	0.7															
250.	*	0.9	0.9	0.9	0.9	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.5	0.4	0.3	0.9	0.9	
1.	1.	1.2	1.2															
260.	*	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.1	1.2	1.3	
1.4	1.5	1.5	1.6															
270.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.	1.3	1.4	
1.4	1.5	1.6	1.7															
280.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	1.1	1.2	
1.3	1.4	1.5	1.5															
290.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	1.	1.1	
1.3	1.3	1.3	1.4															
300.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.	1.	1.	
1.1	1.1	1.2	1.2															
310.	*	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.9	1.	
1.	1.1	1.2	1.2															
320.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.9	1.	
1.1	1.1	1.1	1.1															
330.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.1	
1.1	1.1	1.1	1.1															
340.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.1	
1.1	1.1	1.1	1.1															

```
 350.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.1    1.1
 1.1    1.1    1.1    1.1
 360.  *    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.1    1.1
 1.1    1.1    1.1    1.1

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *     1.     1.     1.    1.1    1.1    1.1    1.1    1.1     1.     1.    1.1    1.1     1.     1.     1.9    1.9
 1.9    1.9    1.9     2.
 DEGR. *     80     80     80     80     90     80     80     80     80     80     80     80     80     90     70     70
 70     70     60     70
```



```
      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
 REC77  REC78  REC79  REC80

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    1.1    1.1    1.1    1.1    1.1    1.2    1.2    1.2    1.2     1.    1.1     1.    0.9    0.9     1.     1.
   1.    1.1    1.1     1.
  10.  *    1.1    1.1    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.1     1.    1.1    0.7     1.     1.     1.
  1.1    1.1    1.1     1.
  20.  *    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.1    1.2     1.    0.6    0.5     1.     1.    1.1
  1.1    1.1     1.     1.
  30.  *    1.3    1.3    1.3    1.3    1.3    1.3    1.3    1.2    1.2    1.1    0.8    0.7    0.5     1.    1.2    1.2
  1.2    1.1    1.1    1.1
  40.  *    1.4    1.4    1.4    1.4    1.4    1.3    1.4    1.4    1.3    1.1     1.    0.8    0.8    1.1    1.1    1.2
  1.2    1.2    1.1    1.1
```

```
 50.  *    1.7    1.6    1.6    1.5    1.5    1.6    1.7    1.7    1.6    1.3    1.    0.8    0.9    1.    1.1    1.1
 1.2    1.1    1.1    1.
 60.  *    2.    1.9    2.    2.2    2.2    1.9    1.9    1.8    1.5    1.2    1.    1.    1.1    0.8    0.9    1.
 1.3    1.1    1.1    1.
 70.  *    2.1    1.9    1.9    1.9    1.9    1.7    1.7    1.6    1.6    1.1    1.    0.8    0.6    0.5    0.7    0.8
 1.    0.9    0.9    0.9
 80.  *    1.4    1.2    1.3    1.3    1.3    1.2    1.2    1.    0.9    0.6    0.4    0.4    0.3    0.2    0.3    0.4
 0.6    0.5    0.5    0.5
 90.  *    0.6    0.6    0.6    0.6    0.6    0.5    0.5    0.4    0.5    0.2    0.1    0.1    0.1    0.    0.1    0.2
 0.3    0.2    0.2    0.2
100.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.2    0.3    0.3    0.3    0.3    0.    0.    0.1
0.2    0.1    0.1    0.1
110.  *    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.3    0.2    0.2    0.2    0.2    0.    0.    0.1
0.1    0.1    0.1    0.1
120.  *    0.2    0.1    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.3    0.    0.    0.1
0.1    0.1    0.1    0.1
130.  *    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.1    0.1    0.2    0.3    0.3    0.    0.    0.
0.1    0.1    0.1    0.
140.  *    0.    0.    0.    0.    0.1    0.    0.    0.1    0.1    0.1    0.1    0.1    0.2    0.    0.    0.
0.    0.    0.    0.
150.  *    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.1    0.1    0.1    0.    0.    0.
0.    0.    0.    0.
160.  *    0.    0.    0.    0.    0.1    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.
0.1    0.    0.    0.
170.  *    0.    0.    0.    0.    0.1    0.    0.    0.    0.    0.    0.    0.    0.    0.1    0.    0.
0.    0.    0.    0.
180.  *    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.2    0.2    0.1
0.1    0.    0.    0.
190.  *    0.    0.    0.    0.    0.1    0.    0.    0.    0.    0.    0.    0.    0.    0.3    0.2    0.2
0.3    0.2    0.1    0.1
200.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.    0.    0.    0.    0.    0.2    0.2    0.2
0.3    0.3    0.3    0.3
210.  *    0.2    0.1    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.    0.    0.    0.    0.3    0.2    0.3
0.3    0.3    0.3    0.3
220.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.    0.    0.    0.2    0.2    0.3
0.2    0.3    0.3    0.3
230.  *    0.4    0.3    0.3    0.4    0.4    0.3    0.4    0.3    0.2    0.1    0.    0.    0.    0.2    0.2    0.2
0.3    0.2    0.2    0.2
240.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.4    0.2    0.1    0.1    0.2    0.3    0.5
0.6    0.6    0.6    0.4
```

```
 250.  *    1.3    1.2    1.2    1.4    1.4    1.3    1.4    1.3    1.2    0.9    0.6    0.4    0.3    0.5    0.6    0.8
 1.    0.8    0.9    0.9
 260.  *    1.7    1.7    1.7    1.8    1.9    1.8    1.9    1.9    1.7    1.4    1.1    0.9    0.7    0.9     1.    1.1
 1.1     1.     1.    1.1
 270.  *    1.8    1.8    1.8    1.8    1.8    1.8    1.8    1.8    1.7    1.5    1.2    1.1    0.9    0.8     1.    1.1
 1.     1.    1.3    1.3
 280.  *    1.5    1.5    1.7    1.7    1.7    1.7    1.7    1.7    1.6    1.5    1.2    1.1    0.9    0.8    0.8    0.6
 1.1     1.    1.1    1.3
 290.  *    1.4    1.4    1.4    1.4    1.5    1.4    1.4    1.4    1.4    1.3    1.2     1.    0.9    0.5    0.5    0.9
 1.    1.1    1.2    1.2
 300.  *    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.1     1.    0.9    0.8    0.6     1.     1.
 1.2    1.2    1.2    1.2
 310.  *    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.1    1.1    0.9    0.8    0.9     1.    1.1    1.2
 1.3    1.2    1.2    1.2
 320.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.9    0.8    0.8     1.    0.9    1.2
 1.1    1.2    1.1    1.1
 330.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.9    0.8    0.8    0.9    1.1     1.
 1.     1.    1.1    1.1
 340.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.8     1.    0.8     1.     1.     1.
 1.     1.    1.1    1.1
 350.  *    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.1    1.2    1.1    0.9    0.9    0.8    0.9     1.     1.
 1.     1.    1.1     1.
 360.  *    1.1    1.1    1.1    1.1    1.1    1.2    1.2    1.2    1.2     1.    1.1     1.    0.9    0.9     1.     1.
 1.    1.1    1.1     1.

 ------*-----------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *    2.1    1.9     2.    2.2    2.2    1.9    1.9    1.9    1.7    1.5    1.2    1.1    1.1    1.1    1.2    1.2
 1.3    1.2    1.3    1.3
 DEGR. *     70     60     60     60     60     60     60    260    260    270    270     10     60     40     30     30
 60     40    270    270
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88	REC89	REC90	REC91	REC92	REC93	REC94	REC95	REC96	REC97	REC98	REC99	REC100
.	*	1.	1.	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.6	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.
10.	*	1.	0.9	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.5	0.2	0.	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1
20.	*	1.	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.4	0.2	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
30.	*	1.	0.9	0.9	0.9	0.9	0.9	0.8	0.9	0.7	0.5	0.3	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
40.	*	1.	0.9	0.9	0.9	0.9	0.9	0.7	0.9	0.7	0.4	0.3	0.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1
50.	*	1.	1.	1.	0.9	0.8	0.9	0.8	0.8	0.6	0.4	0.3	0.	0.	0.1	0.2	0.2	0.2	0.2	0.2	0.2
60.	*	1.	1.	1.	0.9	0.9	0.8	0.7	0.7	0.6	0.4	0.4	0.1	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.5
70.	*	0.7	0.7	0.7	0.7	0.6	0.7	0.6	0.6	0.5	0.3	0.3	0.2	0.3	0.4	0.5	0.6	0.6	0.6	0.7	0.8
80.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.5	0.4	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.7	0.8	0.9	1.1
90.	*	0.2	0.1	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.	0.	0.3	0.4	0.6	0.6	0.7	0.8	0.9	0.9	1.2
100.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.	0.	0.2	0.5	0.6	0.7	0.8	0.9	1.	1.	1.2
110.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.2	0.4	0.5	0.7	0.8	0.8	0.9	0.9	1.2
120.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.2	0.4	0.5	0.6	0.7	0.8	0.8	0.8	1.1
130.	*	0.	0.	0.1	0.	0.	0.	0.	0.1	0.1	0.	0.	0.2	0.5	0.6	0.7	0.7	0.8	0.8	0.8	1.2
140.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.	0.	0.2	0.5	0.6	0.7	0.8	0.8	0.8	0.8	1.2

150. * 0. 0. 0. 0. 0. 0. 0. 0.1 0.1 0. 0. 0.2 0.5 0.7 0.8 0.8
0.8 0.8 0.8 1.2
160. * 0. 0. 0. 0. 0. 0. 0. 0.1 0.1 0.1 0. 0.3 0.6 0.7 0.8 0.8
0.8 0.8 0.8 1.3
170. * 0. 0. 0. 0. 0. 0. 0. 0.1 0.1 0. 0. 0.3 0.6 0.8 0.8 0.8
0.8 0.8 0.9 1.2
180. * 0. 0. 0. 0. 0. 0. 0. 0.1 0.1 0.1 0. 0.5 0.7 0.8 0.8 0.8
0.8 0.8 1. 1.2
190. * 0. 0. 0.1 0. 0. 0. 0. 0.1 0.1 0.1 0. 0.6 0.8 0.8 0.8 0.8
0.8 0.8 1.1 1.3
200. * 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0. 0.7 0.9 0.8 0.8 0.8
0.8 0.9 1.2 1.3
210. * 0.3 0.3 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.8 0.9 0.9 0.9 0.9
1. 1.1 1.3 1.5
220. * 0.3 0.3 0.2 0.2 0.1 0.1 0.1 0.2 0.2 0.2 0.1 0.9 1.1 1.1 1.1 1.1
1.1 1.3 1.5 1.5
230. * 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.4 0.4 0.3 0.2 1.2 1.2 1.2 1.1 1.2
1.3 1.4 1.7 1.8
240. * 0.4 0.4 0.5 0.5 0.5 0.5 0.5 0.7 0.7 0.7 0.5 1.3 1.4 1.4 1.3 1.4
1.5 1.8 2.1 2.1
250. * 0.9 0.9 1. 1.1 1.1 1. 1.1 1.2 1.1 1.1 1. 1.3 1.2 1.1 1.2 1.5
1.6 1.7 1.9 2.
260. * 1.2 1.4 1.5 1.5 1.3 1.4 1.3 1.5 1.4 1.4 1.4 0.8 0.8 0.9 0.9 0.9
1. 1. 1. 1.2
270. * 1.4 1.3 1.4 1.4 1.4 1.3 1.3 1.4 1.4 1.4 1.3 0.3 0.3 0.4 0.4 0.4
0.4 0.4 0.5 0.5
280. * 1.2 1.2 1.2 1.2 1.1 1.4 1.3 1.3 1.3 1.2 1.1 0.1 0.2 0.2 0.2 0.2
0.2 0.2 0.3 0.3
290. * 1.2 1.2 1.3 1.2 1.2 1.2 1.2 1.1 1.1 1.1 0.9 0.1 0.1 0.1 0.1 0.1
0.1 0.1 0.1 0.2
300. * 1.2 1.2 1.1 1. 1. 1. 1. 1. 0.9 0.9 0.7 0.1 0.1 0.1 0.1 0.1
0.1 0.1 0.1 0.1
310. * 1.2 1. 1. 1. 1. 0.9 0.9 0.8 0.9 0.9 0.7 0. 0.1 0.1 0.1 0.1
0.1 0.1 0.1 0.1
320. * 1.1 1. 1. 1. 1. 0.9 0.8 0.7 0.8 0.9 0.5 0. 0. 0.1 0. 0.
0. 0.1 0.1 0.1
330. * 1. 1. 1. 1. 0.9 0.8 0.8 0.7 0.7 0.7 0.4 0. 0.1 0. 0. 0.
0. 0. 0. 0.
340. * 1. 1. 1. 1. 0.9 0.8 0.8 0.7 0.7 0.7 0.4 0. 0. 0. 0. 0.
0. 0.1 0.1 0.1

```
 350.  *     1.     1.     1.    0.9    0.8    0.8    0.8    0.7    0.7    0.7    0.3     0.     0.     0.     0.     0.
 0.     0.    0.1    0.1
 360.  *     1.     1.    0.9    0.8    0.8    0.8    0.8    0.7    0.7    0.6    0.3     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.4    1.4    1.5    1.5    1.4    1.4    1.3    1.5    1.4    1.4    1.4    1.3    1.4    1.4    1.3    1.5
 1.6    1.8    2.1    2.1
 DEGR. *    270    260    260    260    270    260    260    260    260    260    260    240    240    240    240    250
 250    240    240    240
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

```
WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC101 REC102 REC103 REC104 REC105 REC106 REC107 REC108 REC109 REC110 REC111 REC112 REC113 REC114 REC115 REC116
REC117 REC118 REC119 REC120

------*-----------------------------------------------------------------------------------------------------------------
---------------------
   .  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.    0.1     0.    0.6    0.6    0.6    0.5    0.4
   0.6    0.6    0.4    0.5
 10.  *    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.    0.5    0.5    0.4    0.4    0.5
 0.4    0.7    0.7    0.9
 20.  *    0.1    0.1    0.1    0.1    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.5    0.5    0.5    0.6    0.5
 0.8    0.8    0.8    0.9
 30.  *    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.7    0.8    0.7    0.5    0.7
 0.8    0.8    0.9    0.9
 40.  *    0.2    0.2    0.2    0.2    0.3    0.1    0.1    0.1    0.1    0.1    0.1    0.8    0.9    0.8    0.6    0.7
 0.8    0.9    0.9    0.9
```

```
  50.  *    0.3    0.3    0.3    0.3    0.5    0.3    0.3    0.3    0.3    0.3    0.3    0.9    0.8    0.7    0.6    0.7
  0.8    0.8    0.8    0.8
  60.  *    0.6    0.7    0.7    0.8    0.8    0.7    0.6    0.7    0.7    0.7    0.7     1.    0.9    0.5    0.5    0.5
  0.6    0.7    0.7    0.7
  70.  *     1.     1.    1.2    1.4    1.4    1.2    1.2    1.2    1.2    1.3    1.4    0.5    0.3    0.3    0.4    0.5
  0.5    0.6    0.6    0.7
  80.  *    1.3    1.5    1.6    1.6    1.7    1.6    1.6    1.6    1.7    1.8    1.8    0.3    0.3    0.1    0.3    0.3
  0.4    0.5    0.5    0.6
  90.  *    1.4    1.6    1.7    1.8    1.8    1.8    1.8    1.9    1.9    1.9    1.9    0.2    0.2    0.3    0.3    0.3
  0.4    0.5    0.5    0.6
 100.  *    1.6    1.7    1.7    1.8    1.8    1.6    1.7    1.7    1.7    1.8    1.8    0.2    0.2    0.3    0.3    0.4
0.5    0.5    0.5    0.6
 110.  *    1.4    1.5    1.5    1.5    1.6    1.6    1.6    1.6    1.6    1.5    1.5    0.2    0.3    0.3    0.4    0.4
0.5    0.5    0.6    0.6
 120.  *    1.3    1.3    1.3    1.3    1.4    1.4    1.4    1.4    1.4    1.4    1.3    0.3    0.3    0.3    0.4    0.5
0.6    0.7    0.7    0.7
 130.  *    1.3    1.3    1.3    1.3    1.4    1.3    1.3    1.3    1.3    1.3    1.3    0.3    0.3    0.4    0.4    0.5
0.6    0.6    0.6    0.7
 140.  *    1.2    1.2    1.2    1.3    1.2    1.2    1.2    1.2    1.2    1.2    1.1    0.2    0.3    0.4    0.4    0.5
0.5    0.5    0.5    0.7
 150.  *    1.2    1.1    1.1    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    0.1    0.1    0.2    0.2    0.3
0.4    0.4    0.4    0.5
 160.  *    1.3    1.3    1.1    1.2    1.2    1.2    1.2    1.2    1.2    1.2     1.    0.     0.1    0.1    0.1    0.2
0.3    0.3    0.3    0.5
 170.  *    1.2    1.1    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.5    1.2    0.     0.     0.     0.     0.1
0.1    0.2    0.2    0.3
 180.  *    1.2    1.2    1.3    1.2    1.2    1.2    1.4    1.4    1.5    1.3     1.    0.     0.     0.     0.     0.
0.    0.1    0.1    0.2
 190.  *    1.2    1.2    1.3    1.3    1.6    1.4    1.4    1.5    1.3    1.2    0.8    0.     0.     0.     0.     0.
0.     0.     0.    0.1
 200.  *    1.3    1.5    1.6    1.6    1.5    1.4    1.4    1.4    1.4    1.3    0.7    0.     0.     0.     0.     0.
0.     0.     0.    0.1
 210.  *    1.6    1.7    1.7    1.5    1.5    1.4    1.4    1.3    1.2    1.1    0.8    0.     0.     0.     0.     0.
0.     0.     0.    0.1
 220.  *    1.6    1.5    1.5    1.6    1.5    1.5    1.5    1.5    1.3    1.1    0.9    0.     0.     0.     0.     0.
0.     0.     0.     0.
 230.  *    1.9    1.9    1.8    1.8    1.8    1.7    1.6    1.4    1.2    1.3     1.    0.     0.     0.     0.     0.
0.     0.     0.     0.
 240.  *    2.2    2.2    2.2    2.2     2.    1.9    1.6    1.5    1.4    1.3    1.1    0.     0.     0.     0.     0.
0.     0.     0.     0.
```

```
 250.  *     2.     2.    1.8    1.8    1.8    1.4    1.3    1.3    1.3    1.2     1.    0.3    0.3    0.1    0.1    0.1
 0.1     0.     0.     0.
 260.  *    1.2    1.2    1.3    1.2    1.2     1.    0.8    0.8    0.6    0.8    0.6    0.6    0.4    0.4    0.4    0.3
 0.2    0.1    0.1    0.1
 270.  *    0.5    0.5    0.5    0.6    0.6    0.3    0.3    0.4    0.5    0.4    0.5    0.9    0.7    0.7    0.5    0.4
 0.4    0.3    0.3    0.2
 280.  *    0.3    0.3    0.4    0.4    0.4    0.3    0.3    0.4    0.4    0.4    0.5    0.9    0.7    0.7    0.6    0.6
 0.5    0.4    0.3    0.3
 290.  *    0.2    0.3    0.3    0.3    0.4    0.3    0.3    0.3    0.4    0.3    0.5    0.8    0.7    0.6    0.6    0.6
 0.4    0.4    0.4    0.5
 300.  *    0.1    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.7    0.6    0.6    0.6    0.5
 0.4    0.4    0.4    0.5
 310.  *    0.1    0.1    0.2    0.2    0.2    0.2    0.3    0.3    0.3    0.2    0.3    0.7    0.7    0.7    0.4    0.4
 0.4    0.4    0.4    0.4
 320.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.7    0.7    0.5    0.5    0.4
 0.3    0.3    0.4    0.5
 330.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.    0.1    0.1    0.2    0.7    0.5    0.5    0.5    0.5
 0.3    0.4    0.4    0.4
 340.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.7    0.6    0.5    0.4    0.3
 0.4    0.5    0.4    0.6
 350.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.6    0.7    0.6    0.6    0.5
 0.7    0.6    0.6    0.6
 360.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.    0.1     0.    0.6    0.6    0.6    0.5    0.4
 0.6    0.6    0.4    0.5

------*-------------------------------------------------------------------------------------------------------------------
---------------------
MAX   *    2.2    2.2    2.2    2.2     2.    1.9    1.8    1.9    1.9    1.9    1.9     1.    0.9    0.8    0.6    0.7
 0.8    0.9    0.9    0.9
DEGR. *    240    240    240    240    240    240     90     90     90     90     90     60     40     40     20     30
 20     40     30     10
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC121	REC122	REC123	REC124	REC125	REC126	REC127	REC128	REC129	REC130	REC131	REC132	REC133	REC134	REC135	REC136	REC137	REC138	REC139	REC140
.	*	0.5	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9	0.9	1.
10.	*	0.9	0.9	0.9	1.	1.	1.1	1.1	1.1	1.	0.2	0.4	0.4	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7
20.	*	0.9	1.	1.	1.1	1.2	1.2	1.1	0.9	0.8	0.1	0.3	0.3	0.3	0.3	0.4	0.5	0.6	0.6	0.6	0.6
30.	*	1.	1.	0.9	0.9	1.	1.	0.8	0.8	0.7	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.6	0.6	0.7
40.	*	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.5	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.4	0.4
50.	*	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2
60.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.5	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
70.	*	0.7	0.6	0.6	0.6	0.6	0.6	0.4	0.4	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.1
80.	*	0.6	0.6	0.6	0.6	0.6	0.5	0.4	0.3	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
90.	*	0.6	0.6	0.6	0.6	0.6	0.4	0.4	0.3	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100.	*	0.6	0.6	0.6	0.6	0.5	0.4	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1
110.	*	0.6	0.6	0.6	0.6	0.4	0.4	0.3	0.3	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2
120.	*	0.7	0.7	0.6	0.5	0.4	0.4	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.2
130.	*	0.6	0.6	0.5	0.4	0.4	0.4	0.3	0.2	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.2	0.2	0.3
140.	*	0.6	0.5	0.4	0.4	0.4	0.3	0.3	0.2	0.	0.	0.	0.	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5

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150.  *    0.5    0.5    0.4    0.4    0.4    0.3    0.2    0.2    0.     0.     0.     0.2    0.2    0.3    0.4    0.5
0.5    0.6    0.7    0.8
160.  *    0.4    0.4    0.4    0.4    0.3    0.3    0.2    0.1    0.     0.     0.1    0.2    0.3    0.4    0.5    0.6
0.8    0.9     1.    1.2
170.  *    0.3    0.3    0.3    0.2    0.2    0.2    0.1    0.1    0.     0.     0.1    0.2    0.3    0.5    0.8     1.
1.1    1.2    1.2    1.3
180.  *    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.     0.     0.     0.1    0.2    0.5    0.7    0.8    0.9
0.9    1.3    1.3    1.3
190.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.     0.     0.1    0.3    0.5    0.7    0.9    0.9
1.     1.     1.     1.
200.  *    0.1    0.1    0.1    0.1    0.     0.     0.     0.     0.     0.     0.1    0.3    0.5    0.8    0.9    0.9
0.9    0.9    0.9    0.9
210.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.3    0.7    0.8    0.8    0.8
0.8    0.8    0.8    0.8
220.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.4    0.7    0.8    0.8    0.8
0.8    0.8    0.8    0.7
230.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.2    0.4    0.7    0.7    0.7    0.7
0.7    0.7    0.7    0.7
240.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.3    0.4    0.7    0.7    0.7    0.7
0.7    0.7    0.7    0.7
250.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.2    0.4    0.4    0.7    0.7    0.8    0.7
0.7    0.7    0.7    0.7
260.  *    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.3    0.4    0.4    0.7    0.7    0.8    0.8
0.8    0.8    0.8    0.8
270.  *    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.4    0.5    0.6    0.8    0.8    0.8    0.8
0.9    0.9     1.     1.
280.  *    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.4    0.5    0.6    0.8    0.8    0.9    1.1
1.1    1.1    1.1    1.1
290.  *    0.5    0.3    0.3    0.2    0.2    0.1    0.1    0.1    0.1    0.4    0.5    0.8     1.     1.    1.1    1.2
1.2    1.2    1.2    1.2
300.  *    0.5    0.5    0.4    0.4    0.3    0.3    0.2    0.2    0.1    0.6    0.6    0.9    1.1    1.1    1.1    1.2
1.1    1.1    1.1     1.
310.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.3    0.3    0.7    0.7     1.    1.2    1.2    1.2    1.2
1.2    1.1     1.    1.1
320.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.3    0.3    0.3    0.7    0.9    1.1    1.3    1.3    1.2    0.9
1.     1.     1.    0.9
330.  *    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.4    0.7    0.8     1.    1.2    1.2    1.3    1.4
1.4    1.2    1.3    1.1
340.  *    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.6    0.5    0.6    0.8    0.9     1.     1.    1.2    1.2
1.2    1.1     1.    1.1
```

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 350.  *    0.7    0.7    0.6    0.6    0.6    0.6    0.6    0.7    0.7    0.4    0.4    0.6    0.6    0.7    0.7    0.7
 0.8    0.9     1.    1.1
 360.  *    0.5    0.7    0.7    0.7    0.7    0.7    0.8    0.8    0.8    0.6    0.6    0.6    0.6    0.7    0.7    0.7
 0.8    0.9    0.9     1.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *     1.     1.     1.    1.1    1.2    1.2    1.1    1.1     1.    0.7    0.9    1.1    1.3    1.3    1.3    1.4
 1.4    1.3    1.3    1.3
 DEGR. *     30     20     20     20     20     20     10     10     10    310    320    320    320    320    330    330
 330    180    180    170
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC141	REC142	REC143	REC144	REC145	REC146
.	0.8	0.6	0.6	0.7	0.6	1.
10.	0.6	0.5	0.5	0.5	0.8	1.
20.	0.5	0.5	0.6	0.6	0.9	1.
30.	0.5	0.5	0.5	0.6	0.9	1.
40.	0.5	0.5	0.5	0.6	0.8	0.8
50.	0.3	0.4	0.4	0.6	0.7	0.9
60.	0.2	0.2	0.2	0.4	0.5	0.7
70.	0.1	0.1	0.1	0.2	0.2	0.4
80.	0.	0.	0.	0.	0.1	0.2
90.	0.	0.	0.	0.	0.	0.
100.	0.	0.	0.	0.	0.	0.
110.	0.	0.	0.	0.	0.	0.
120.	0.	0.	0.	0.	0.	0.

130.	*	0.1	0.	0.	0.	0.	0.
140.	*	0.2	0.1	0.	0.	0.	0.
150.	*	0.4	0.2	0.2	0.	0.	0.
160.	*	0.7	0.6	0.4	0.2	0.1	0.
170.	*	1.	0.8	0.7	0.5	0.3	0.1
180.	*	1.1	1.	0.7	0.6	0.5	0.3
190.	*	0.9	0.8	0.7	0.7	0.6	0.5
200.	*	0.9	0.8	0.7	0.6	0.6	0.5
210.	*	0.8	0.8	0.7	0.6	0.4	0.4
220.	*	0.8	0.7	0.6	0.5	0.4	0.2
230.	*	0.7	0.7	0.6	0.4	0.3	0.2
240.	*	0.7	0.7	0.5	0.3	0.3	0.2
250.	*	0.8	0.8	0.6	0.4	0.5	0.4
260.	*	0.9	0.9	0.7	0.6	0.7	0.8
270.	*	1.1	1.1	0.8	0.7	0.9	0.9
280.	*	1.	1.	0.6	0.8	0.7	0.7
290.	*	1.1	1.	0.6	0.8	0.6	0.6
300.	*	1.1	0.8	0.7	0.7	0.5	0.5
310.	*	0.8	0.7	0.6	0.4	0.6	0.5
320.	*	0.9	0.9	0.6	0.5	0.6	0.8
330.	*	0.9	0.9	0.5	0.5	0.6	0.8
340.	*	0.9	0.6	0.4	0.6	0.5	0.7
350.	*	0.8	0.5	0.5	0.5	0.6	0.9
360.	*	0.8	0.6	0.6	0.7	0.6	1.
------	*	----------					
MAX	*	1.1	1.1	0.8	0.8	0.9	1.
DEGR.	*	180	270	270	280	20	0

THE HIGHEST CONCENTRATION OF 2.20 ppm OCCURRED AT RECEPTOR REC64.

FF

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**********************************************
**
** CAL3QHC Combined Output File Produced by:
** CALRoads View Ver. 3.9.0
** Lakes Environmental Software Inc.
** Date: 12/6/2012 12:59:44 AM
** File: F:\2975 FirstLight\Microscale\Worst\34 Dean Longmeadow & Owen LOS&ADT\2022ASA.ou2
**
**********************************************
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CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 A Sat RUN: CAL3QHC RUN

DATE : 12/ 6/12
TIME : 0:59:42

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 100. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M)				*	LENGTH	BRG	TYPE
VPH EF H W V/C QUEUE	*	X1	Y1	X2	Y2	*	(M)		
	*	(DEG)	(G/MI)	(M)	(M)	(VEH)			
1. Dean EB LL	*	235106.84	850497.38	235156.62	850512.50	*	52.	73.	AG
14. 8.5 0.0 9.0									
2. Dean EB LL QUEUE	*	235156.62	850512.50	235150.05	850510.50	*	7.	253.	AG
116. 100.0 0.0 3.0 0.93 1.1									
3. Dean EB TR	*	235066.06	850482.19	235155.91	850506.75	*	93.	75.	AG

945. 8.5 0.0 13.4

4. Dean EB TR QUEUE * 235155.91 850506.75 235062.28 850481.12 * 97. 255. AG
172. 100.0 0.0 7.4 1.00 16.2

5. Dean WB LL * 235225.55 850536.69 235185.14 850524.44 * 42. 253. AG
288. 8.5 0.0 9.4

6. Dean WB LL QUEUE * 235185.14 850524.44 235403.61 850590.69 * 228. 73. AG
102. 100.0 0.0 3.4 1.22 38.0

7. Dean WB TR * 235275.70 850557.25 235185.14 850530.19 * 95. 253. AG
967. 8.5 0.0 13.4

8. Dean WB TR QUEUE * 235185.14 850530.19 235233.73 850544.69 * 51. 73. AG
129. 100.0 0.0 7.4 0.60 8.5

9. Owen NB LL * 235207.16 850428.06 235179.00 850508.50 * 85. 341. AG
56. 8.5 0.0 9.7

10. Owen NB LL QUEUE * 235179.00 850508.50 235181.78 850500.56 * 8. 161. AG
92. 100.0 0.0 3.7 0.15 1.4

11. Owen NB T * 235208.59 850429.88 235181.17 850508.88 * 84. 341. AG
250. 8.5 0.0 9.7

12. Owen NB T QUEUE * 235181.17 850508.88 235193.47 850473.44 * 38. 161. AG
92. 100.0 0.0 3.7 0.66 6.3

13. Owen NB R * 235207.52 850436.38 235189.47 850493.75 * 60. 343. AG
360. 8.5 0.0 9.7

14. Owen NB R QUEUE * 235189.47 850493.75 235211.16 850424.81 * 72. 163. AG
92. 100.0 0.0 3.7 0.95 12.0

15. Longmeadow SB L * 235147.36 850577.25 235162.05 850535.25 * 44. 161. AG
218. 8.5 0.0 9.0

16. Longmeadow SB L QUEUE * 235162.05 850535.25 235151.41 850566.19 * 33. 341. AG
92. 100.0 0.0 3.0 0.58 5.4

17. Longmeadow SB TR * 235134.16 850612.38 235159.88 850533.06 * 83. 162. AG
287. 8.5 0.0 9.0

18. Longmeadow SB TR QUEUE * 235159.88 850533.06 235146.00 850575.69 * 45. 342. AG
92. 100.0 0.0 3.0 0.76 7.5

19. Dean EB OUTBOUND * 235195.64 850518.06 235273.02 850547.94 * 83. 69. AG
1439. 8.5 0.0 13.4

20. Dean WB OUTBOUND * 235156.41 850522.00 235064.98 850493.25 * 96. 253. AG
818. 8.5 0.0 13.4

21. Longmeadow NB OUTBOUND * 235170.09 850535.00 235137.33 850611.62 * 83. 337. AG
494. 8.5 0.0 9.0

22. Owen SB OUTBOUND * 235175.48 850492.88 235201.41 850426.62 * 71. 159. AG
634. 8.5 0.0 9.7

23. EBL * 235157.16 850512.56 235169.77 850534.62 * 25. 30. AG

14. 9.4 0.0 9.0
24. EBT * 235156.48 850506.94 235194.47 850517.81 * 40. 74. AG
861. 8.5 0.0 12.0
25. EBR * 235146.28 850504.06 235174.59 850494.12 * 30. 109. AG
84. 10.3 0.0 9.0
26. WBL * 235183.81 850524.38 235172.95 850497.75 * 29. 202. AG
288. 9.4 0.0 9.0
27. WBT * 235184.27 850530.12 235156.48 850522.06 * 29. 254. AG
737. 8.5 0.0 12.0
28. WBR * 235184.27 850529.44 235168.45 850535.38 * 17. 291. AG
230. 10.3 0.0 9.0
29. NBL * 235178.67 850509.50 235156.05 850521.88 * 26. 299. AG
56. 9.4 0.0 9.0
30. NBT * 235180.75 850510.00 235170.09 850534.50 * 27. 336. AG
250. 8.5 0.0 9.0
31. NBR * 235188.33 850495.06 235198.97 850518.94 * 26. 24. AG
360. 10.3 0.0 9.0
32. SBL * 235162.09 850534.69 235188.55 850516.94 * 32. 124. AG
218. 9.4 0.0 9.0
33. SBT * 235159.89 850532.50 235173.73 850497.75 * 37. 158. AG
262. 8.5 0.0 9.0
34. SBR * 235160.44 850532.31 235155.61 850521.56 * 12. 204. AG
25. 10.3 0.0 9.0

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 A Sat RUN: CAL3QHC
RUN

DATE : 12/ 6/12
TIME : 0:59:42

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. Dean EB LL QUEUE	*	120	113	4.0	14	1900	45.89	3	3

4. Dean EB TR QUEUE	*	120	84	4.0	945	1900	45.89	3	3
6. Dean WB LL QUEUE	*	120	99	4.0	288	1900	45.89	3	3
8. Dean WB TR QUEUE	*	120	63	4.0	967	1900	45.89	3	3
10. Owen NB LL QUEUE	*	120	90	4.0	56	1900	45.89	3	3
12. Owen NB T QUEUE	*	120	90	4.0	250	1900	45.89	3	3
14. Owen NB R QUEUE	*	120	90	4.0	360	1900	45.89	3	3
16. Longmeadow SB L QUEUE	*	120	90	4.0	218	1900	45.89	3	3
18. Longmeadow SB TR QUEUE	*	120	90	4.0	287	1900	45.89	3	3

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z	*
1. LR_1	*	235178.36	850537.06	1.8	*
2. LR_2	*	235171.39	850540.94	1.8	*
3. LR_3	*	235169.19	850544.88	1.8	*
4. LR_4	*	235166.98	850548.81	1.8	*
5. LR_5	*	235163.70	850553.81	1.8	*
6. LR_6	*	235161.97	850558.50	1.8	*
7. LR_7	*	235160.23	850563.19	1.8	*
8. LR_8	*	235158.48	850567.88	1.8	*
9. LR_9	*	235156.75	850572.56	1.8	*
10. LR_10	*	235155.02	850577.25	1.8	*
11. LR_11	*	235153.27	850581.94	1.8	*
12. LR_12	*	235151.53	850586.62	1.8	*
13. LR_13	*	235149.80	850591.31	1.8	*
14. LR_14	*	235148.05	850596.00	1.8	*
15. LR_15	*	235146.31	850600.69	1.8	*
16. LR_16	*	235144.56	850605.38	1.8	*
17. LR_17	*	235142.83	850610.06	1.8	*
18. LR_18	*	235130.50	850610.00	1.8	*
19. LR_19	*	235132.23	850605.31	1.8	*
20. LR_20	*	235133.98	850600.62	1.8	*
21. LR_21	*	235135.72	850595.94	1.8	*
22. LR_22	*	235137.45	850591.25	1.8	*
23. LR_23	*	235139.20	850586.56	1.8	*
24. LR_24	*	235140.94	850581.88	1.8	*
25. LR_25	*	235142.69	850577.19	1.8	*

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 A Sat RUN: CAL3QHC
RUN

RECEPTOR	COORDINATES (M) X	Y	Z
26. LR_26	235144.42	850572.50	1.8
27. LR_27	235146.16	850567.81	1.8
28. LR_28	235147.91	850563.12	1.8
29. LR_29	235149.64	850558.44	1.8
30. LR_30	235151.38	850553.75	1.8
31. LR_31	235153.12	850549.06	1.8
32. LR_32	235154.86	850544.38	1.8
33. LR_33	235154.91	850539.38	1.8
34. LR_34	235156.66	850534.69	1.8
35. LR_35	235153.22	850528.19	1.8
36. LR_36	235149.31	850523.50	1.8
37. LR_37	235144.55	850522.06	1.8
38. LR_38	235139.75	850520.56	1.8
39. LR_39	235134.97	850519.12	1.8
40. LR_40	235130.19	850517.69	1.8
41. LR_41	235125.41	850516.25	1.8
42. LR_42	235120.62	850514.75	1.8
43. LR_43	235115.83	850513.31	1.8
44. LR_44	235111.05	850511.88	1.8
45. LR_45	235106.27	850510.38	1.8
46. LR_46	235101.48	850508.94	1.8
47. LR_47	235096.70	850507.50	1.8
48. LR_48	235091.92	850506.00	1.8
49. LR_49	235087.12	850504.56	1.8
50. LR_50	235082.34	850503.12	1.8
51. LR_51	235077.56	850501.69	1.8
52. LR_52	235072.78	850500.19	1.8
53. LR_53	235068.00	850498.75	1.8
54. LR_54	235063.20	850497.31	1.8
55. LR_55	235073.41	850479.50	1.8
56. LR_56	235078.19	850480.94	1.8
57. LR_57	235082.97	850482.38	1.8
58. LR_58	235087.75	850483.81	1.8
59. LR_59	235092.55	850485.31	1.8

60. LR_60	*	235097.31	850486.75	1.8 *
61. LR_61	*	235102.09	850488.19	1.8 *
62. LR_62	*	235107.00	850489.25	1.8 *
63. LR_63	*	235111.78	850490.69	1.8 *
64. LR_64	*	235116.56	850492.12	1.8 *
65. LR_65	*	235121.34	850493.56	1.8 *
66. LR_66	*	235126.88	850494.75	1.8 *
67. LR_67	*	235131.12	850496.00	1.8 *
68. LR_68	*	235135.80	850497.12	1.8 *
69. LR_69	*	235140.27	850497.81	1.8 *
70. LR_70	*	235145.27	850497.75	1.8 *
71. LR_71	*	235149.83	850496.81	1.8 *
72. LR_72	*	235153.11	850496.06	1.8 *
73. LR_73	*	235156.19	850495.12	1.8 *
74. LR_75	*	235202.16	850511.88	1.8 *
75. LR_76	*	235204.62	850514.00	1.8 *
76. LR_77	*	235207.84	850516.75	1.8 *
77. LR_79	*	235212.31	850520.25	1.8 *
78. LR_80	*	235217.08	850521.75	1.8 *

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 A Sat RUN: CAL3QHC
RUN

RECEPTOR	*	X	Y	Z *
	*	COORDINATES (M)		*
79. LR_81	*	235221.84	850523.25	1.8 *
80. LR_82	*	235226.45	850524.75	1.8 *
81. LR_83	*	235231.23	850526.25	1.8 *
82. LR_84	*	235236.00	850527.75	1.8 *
83. LR_85	*	235240.45	850530.38	1.8 *
84. LR_86	*	235245.23	850531.88	1.8 *
85. LR_87	*	235249.98	850533.38	1.8 *
86. LR_88	*	235254.45	850535.50	1.8 *
87. LR_89	*	235259.22	850537.00	1.8 *
88. LR_90	*	235263.38	850541.00	1.8 *
89. LR_91	*	235268.14	850542.50	1.8 *
90. LR_92	*	235272.91	850544.00	1.8 *
91. LR_93	*	235277.69	850545.50	1.8 *
92. LR_94	*	235275.39	850561.56	1.8 *

93. LR_95	*	235270.62	850560.06	1.8	*
94. LR_96	*	235265.86	850558.56	1.8	*
95. LR_97	*	235261.09	850557.00	1.8	*
96. LR_98	*	235256.31	850555.50	1.8	*
97. LR_99	*	235251.56	850554.00	1.8	*
98. LR_100	*	235246.80	850552.50	1.8	*
99. LR_101	*	235242.02	850551.00	1.8	*
**. LR_102	*	235237.27	850549.50	1.8	*
**. LR_103	*	235232.48	850548.00	1.8	*
**. LR_104	*	235227.72	850546.50	1.8	*
**. LR_105	*	235222.95	850545.00	1.8	*
**. LR_106	*	235218.19	850543.44	1.8	*
**. LR_107	*	235213.42	850541.94	1.8	*
**. LR_108	*	235208.66	850541.38	1.8	*
**. LR_109	*	235202.81	850539.88	1.8	*
**. LR_110	*	235198.05	850538.38	1.8	*
**. LR_111	*	235194.19	850537.31	1.8	*
**. LR_112	*	235189.44	850535.81	1.8	*
**. LR_113	*	235184.66	850534.31	1.8	*
**. LR_114	*	235159.12	850493.88	1.8	*
**. LR_115	*	235161.91	850492.31	1.8	*
**. LR_116	*	235165.55	850490.00	1.8	*
**. LR_117	*	235168.09	850487.94	1.8	*
**. LR_118	*	235170.88	850485.00	1.8	*
**. LR_119	*	235173.97	850481.00	1.8	*
**. LR_120	*	235176.31	850476.75	1.8	*
**. LR_121	*	235178.02	850473.00	1.8	*
**. LR_122	*	235181.77	850468.19	1.8	*
**. LR_123	*	235183.45	850463.50	1.8	*
**. LR_124	*	235185.16	850458.81	1.8	*
**. LR_125	*	235186.86	850454.12	1.8	*
**. LR_126	*	235188.56	850449.38	1.8	*
**. LR_127	*	235190.27	850444.69	1.8	*
**. LR_128	*	235191.95	850440.00	1.8	*
**. LR_129	*	235193.66	850435.31	1.8	*
**. LR_130	*	235195.36	850430.56	1.8	*
**. LR_131	*	235197.06	850425.88	1.8	*
**. LR_132	*	235211.48	850433.06	1.8	*
**. LR_133	*	235209.78	850437.75	1.8	*

FF

JOB: First Light-Taunton-Dean, Longmeadow & Owen-2022 A Sat RUN: CAL3QHC
RUN

RECEPTOR	X	Y	Z
**. LR_134	235208.08	850442.50	1.8
**. LR_135	235206.38	850447.19	1.8
**. LR_136	235204.69	850451.88	1.8
**. LR_137	235202.98	850456.56	1.8
**. LR_138	235201.28	850461.25	1.8
**. LR_139	235199.58	850466.00	1.8
**. LR_140	235197.88	850470.69	1.8
**. LR_141	235196.19	850475.38	1.8
**. LR_142	235194.48	850480.06	1.8
**. LR_143	235194.25	850485.06	1.8
**. LR_144	235194.02	850489.75	1.8
**. LR_145	235194.09	850494.19	1.8
**. LR_146	235194.45	850498.88	1.8
**. LR_147	235195.98	850503.62	1.8
**. LR_148	235199.00	850508.31	1.8

MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
.	0.	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.				

```
   0.     0.    0.1    0.1
 10.  *     0.     0.     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 20.  *     0.     0.     0.     0.    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 30.  *     0.     0.     0.     0.    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.1    0.2
 40.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 50.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 60.  *    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.     0.    0.2    0.2
 70.  *    0.4    0.2     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.1    0.2    0.2
 80.  *    0.9    0.5    0.4    0.2    0.1    0.1     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
 90.  *    1.1    0.7    0.5    0.4    0.4    0.3    0.2    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.
 0.    0.2    0.2    0.2
100.  *    1.2    0.9    0.7    0.6    0.5    0.4    0.4    0.3    0.3    0.2    0.1    0.1    0.1    0.1    0.1     0.
0.    0.2    0.2    0.2
110.  *     1.    0.7    0.7    0.7    0.6    0.5    0.5    0.4    0.4    0.4    0.3    0.3    0.3    0.1    0.1    0.1
0.1    0.3    0.3    0.3
120.  *     1.    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.4    0.4    0.3    0.3    0.3
0.2    0.4    0.6    0.6
130.  *    0.8    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.4    0.3
0.2    0.5    0.6    0.6
140.  *    0.7    0.6    0.7    0.6    0.6    0.6    0.6    0.6    0.5    0.4    0.4    0.4    0.4    0.4    0.4    0.3
0.3    0.3    0.3    0.3
150.  *    0.6    0.6    0.6    0.5    0.4    0.4    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2
0.2    0.5    0.4    0.5
160.  *    0.6    0.8    0.7    0.6    0.6    0.6    0.6    0.6    0.5    0.4    0.5    0.5    0.5    0.5    0.5    0.4
0.3    0.3    0.4    0.4
170.  *    0.8    0.9    0.7    0.6    0.4    0.5    0.7    0.7    0.5    0.6    0.7    0.7    0.6    0.6    0.6    0.6
0.6    0.2    0.3    0.3

------*-------------------------------------------------------------------------------------------------------------
--------------------
MAX   *    1.2    0.9    0.7    0.7    0.6    0.6    0.7    0.7    0.5    0.6    0.7    0.7    0.6    0.6    0.6    0.6
0.6    0.5    0.6    0.6
```

DEGR. * 100 100 100 110 110 140 170 170 120 170 170 170 170 170 170 170
170 130 120 120

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8	REC9	REC10	REC11	REC12	REC13	REC14	REC15	REC16	REC17	REC18	REC19	REC20
180.	*	0.8	0.6	0.4	0.4	0.5	0.6	0.7	0.8	0.8	0.9	0.8	0.8	0.7	0.6	0.5	0.5	0.5	0.1	0.1	0.1
190.	*	0.5	0.6	0.4	0.6	0.6	0.9	1.1	1.1	1.1	1.1	1.	0.9	0.7	0.5	0.5	0.4	0.4	0.1	0.1	0.1
200.	*	0.5	0.5	0.5	0.8	0.9	1.1	1.1	1.1	1.1	1.	0.9	0.7	0.7	0.6	0.5	0.4	0.4	0.1	0.1	0.1
210.	*	0.6	0.6	0.7	0.7	1.1	1.1	1.	1.	0.9	1.	0.8	0.7	0.5	0.4	0.4	0.4	0.4	0.	0.	0.1
220.	*	0.8	0.6	0.7	0.9	1.1	1.1	1.	1.	0.9	0.7	0.5	0.3	0.3	0.2	0.2	0.2	0.2	0.	0.	0.
230.	*	0.8	0.5	0.7	0.9	1.	1.	0.9	0.9	0.7	0.5	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.	0.	0.
240.	*	0.8	0.8	0.6	0.8	0.8	0.7	0.7	0.7	0.5	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.	0.	0.
250.	*	0.6	0.5	0.7	0.5	0.7	0.7	0.7	0.6	0.5	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.	0.	0.
260.	*	0.4	0.3	0.5	0.5	0.6	0.7	0.7	0.6	0.5	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.	0.	0.
270.	*	0.4	0.4	0.4	0.5	0.6	0.6	0.6	0.5	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2			

```
0.2     0.     0.     0.
280.  *    0.3    0.6    0.6    0.6    0.7    0.7    0.6    0.5    0.3    0.2    0.3    0.3    0.3    0.3    0.3    0.2
0.1     0.     0.     0.
290.  *    0.3    0.6    0.6    0.7    0.7    0.7    0.6    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.2
0.1     0.     0.     0.
300.  *    0.3    0.7    0.7    0.8    0.8    0.7    0.6    0.5    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2
0.1     0.     0.     0.
310.  *    0.4    0.7    0.6    0.6    0.6    0.6    0.5    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.1
0.1     0.     0.     0.
320.  *    0.4    0.6    0.6    0.6    0.7    0.5    0.5    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.2    0.1
0.1     0.     0.     0.
330.  *    0.1    0.5    0.6    0.5    0.5    0.4    0.4    0.4    0.4    0.4    0.2    0.2    0.2    0.2    0.1    0.1
0.     0.     0.     0.
340.  *    0.1    0.2    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1
0.     0.     0.    0.1
350.  *     0.    0.1    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1     0.
0.     0.     0.    0.1
360.  *     0.    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.
0.     0.    0.1    0.1

------*-----------------------------------------------------------------------------------------------------------------------
---------------------
MAX   *    1.2    0.9    0.7    0.9    1.1    1.1    1.1    1.1    1.1    1.1     1.    0.9    0.7    0.6    0.6    0.6
0.6    0.5    0.6    0.6
DEGR. *    100    100    100    220    210    200    190    190    190    190    190    190    180    170    170    170
170    130    120    120

      MODEL RESULTS
      -------------

      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
```

```
 REC37  REC38  REC39  REC40

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.2    0.2    0.2    0.2    0.2    0.4    0.7    0.8     1.    1.2    1.2    1.4     1.    1.2    0.5    0.4
   0.1     0.     0.     0.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.2    0.2    0.2    0.2    0.2    0.4    0.7    0.8     1.    1.2    1.2    1.4     1.    1.2    0.5    0.4
 0.1     0.     0.     0.
 DEGR. *      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0      0
 0      0      0      0
```



```
       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
                 angle, of the angles with same maximum
                 concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC21  REC22  REC23  REC24  REC25  REC26  REC27  REC28  REC29  REC30  REC31  REC32  REC33  REC34  REC35  REC36
 REC37  REC38  REC39  REC40

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
  10.  *    0.2    0.2    0.2    0.2    0.2    0.3    0.6    0.7    0.9     1.    1.2    1.2     1.     1.    0.7    0.4
  0.4    0.1     0.     0.
  20.  *    0.2    0.2    0.2    0.2    0.2    0.4    0.7    0.7    0.9    1.1    1.1    1.1     1.     1.    0.6    0.4
  0.3    0.4    0.2    0.1
  30.  *    0.2    0.2    0.2    0.2    0.2    0.4    0.7    0.7    0.9     1.     1.     1.    0.8    0.9    0.5    0.3
  0.4    0.4    0.3    0.3
  40.  *    0.2    0.2    0.2    0.2    0.2    0.4    0.6    0.7    0.9     1.     1.     1.    0.8    0.8    0.4    0.4
  0.4    0.3    0.3    0.3
```

```
  50.  *    0.2    0.2    0.2    0.2    0.2    0.6    0.6    0.7    0.8    0.8    0.9    0.9    0.8    0.8    0.3    0.4
  0.3    0.3    0.3    0.3
  60.  *    0.2    0.2    0.2    0.2    0.2    0.6    0.6    0.8    0.8    0.8    0.9    0.9    0.8    0.8    0.3    0.4
  0.5    0.5    0.2    0.2
  70.  *    0.2    0.2    0.2    0.2    0.2    0.6    0.6    0.8    0.8    0.8    0.9    0.9     1.     1.    0.5    0.7
  0.7    0.7    0.8    0.8
  80.  *    0.2    0.2    0.2    0.2    0.2    0.6    0.6    0.8    0.9    0.9    1.1    1.2    1.2    1.2     1.    0.9
  0.9    0.8    0.8    0.8
  90.  *    0.2    0.2    0.2    0.2    0.3    0.7    0.7     1.    1.1    1.3    1.3    1.3    1.4    1.5     1.    0.9
  0.8    0.9    0.9    0.9
 100.  *    0.3    0.3    0.3    0.3    0.5    0.9     1.    1.3    1.3    1.4    1.4    1.5    1.5     1.    0.8    0.7
 0.5    0.6    0.5    0.5
 110.  *    0.3    0.5    0.5    0.5    0.8     1.    1.2    1.4    1.4    1.4    1.4    1.4    1.2     1.    0.5    0.5
 0.4    0.5    0.7    0.6
 120.  *    0.7    0.6    0.6    0.6    0.9    1.2    1.3    1.4    1.4    1.4    1.5    1.6    0.9    0.8    0.4    0.5
 0.5    0.7    0.8    0.6
 130.  *    0.6    0.6    0.7    0.7    1.1    1.2    1.4    1.5    1.3    1.4    1.4    1.3    0.8    0.6    0.5    0.5
 0.7    0.9    0.7    0.9
 140.  *    0.4    0.4    0.4    0.6    0.8     1.    1.1    1.2    1.3    1.4    1.3    1.4    0.9    0.7    0.6    0.7
 0.8    0.8    0.8    0.7
 150.  *    0.5    0.5    0.7    0.8     1.    1.1    1.4    1.3    1.3    1.3    1.4    1.4    0.9    0.6    0.5    0.7
 0.7    0.6    0.7    0.7
 160.  *    0.5    0.6    0.6    0.7    0.7    0.9    0.9    0.9    0.9     1.     1.    1.2    0.6    0.4    0.5    0.6
 0.6    0.7    0.7    0.7
 170.  *    0.3    0.3    0.3    0.5    0.5    0.5    0.5    0.5    0.6    0.5    0.7    0.7    0.5    0.3    0.6    0.6
 0.7    0.7    0.7    0.7
 180.  *    0.2    0.2    0.2    0.4    0.4    0.5    0.5    0.5    0.5    0.5    0.6    0.6    0.3    0.5    0.6    0.7
 0.7    0.7    0.7    0.7
 190.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.5    0.5    0.5    0.4    0.5    0.6    0.7
 0.7    0.7    0.7    0.7
 200.  *    0.1    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.4    0.4    0.5    0.4    0.5    0.6    0.7
 0.7    0.7    0.7    0.7
 210.  *    0.1    0.1    0.2    0.2    0.3    0.3    0.3    0.3    0.4    0.4    0.4    0.4    0.5    0.5    0.8    0.8
 0.8    0.8    0.8    0.8
 220.  *     0.     0.     0.    0.1    0.1    0.2    0.3    0.3    0.3    0.4    0.4    0.4    0.5    0.6    0.8    0.8
 0.8    0.8    0.8    0.8
 230.  *     0.     0.     0.     0.     0.     0.     0.    0.2    0.2    0.3    0.3    0.4    0.5    0.5    0.9    0.9
 0.9    0.9    0.9    0.9
 240.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.2    0.2    0.3    0.5    0.7    0.9
 0.8    0.8    0.7    0.7
```

```
250.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.5    0.7
0.6    0.6    0.6    0.6
260.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.4
0.4    0.4    0.4    0.3
270.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2
0.2    0.2    0.2    0.2
280.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
0.1    0.1    0.1    0.1
290.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1
0.1    0.1    0.1    0.1
300.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.     0.     0.     0.     0.1
0.1    0.1    0.1    0.1
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.1    0.2    0.2    0.     0.     0.     0.     0.
0.1     0.     0.     0.
320.  *     0.     0.     0.     0.     0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.3    0.1    0.1    0.     0.1    0.
0.     0.     0.     0.
330.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.3    0.3    0.4    0.6    0.2    0.2    0.     0.1    0.
0.     0.     0.     0.
340.  *    0.1    0.1    0.1    0.1    0.1    0.2    0.4    0.5    0.7    0.8     1.    1.1    0.8    0.8    0.1     0.     0.
0.     0.     0.     0.
350.  *    0.1    0.2    0.2    0.2    0.3    0.3    0.5    0.8    0.9     1.    1.2    1.3     1.     1.    0.4    0.1    0.
0.     0.     0.     0.
360.  *    0.2    0.2    0.2    0.2    0.2    0.4    0.7    0.8     1.    1.2    1.2    1.4     1.    1.2    0.5    0.4    0.
0.1     0.     0.     0.

------*-----------------------------------------------------------------------------------------------------------------------
----------------------
MAX   *    0.7    0.6    0.7    0.8    1.1    1.2    1.4    1.5    1.4    1.4    1.5    1.6    1.5    1.5     1.    0.9    0.
0.9    0.9    0.9    0.9
DEGR. *    120    120    130    150    130    120    130    130    110    100    120    120    100     90     80     80     80
80     90     90     90
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) REC41	REC42	REC43	REC44	REC45	REC46	REC47	REC48	REC49	REC50	REC51	REC52	REC53	REC54	REC55	REC56	REC57	REC58	REC59	REC60
.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.1	1.	1.	1.	1.	1.
10.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.1	1.1	1.1	1.1	1.1	1.
20.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.1	1.1	1.1	1.2	1.2	1.2
30.	*	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	1.2	1.2	1.2	1.2	1.2	1.2
40.	*	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.4	1.4	1.4	1.4	1.4	1.4
50.	*	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.5	1.5	1.5	1.5	1.5	1.6
60.	*	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	1.6	1.6	1.6	1.7	1.8	1.8
70.	*	0.8	0.8	0.7	0.7	0.8	0.8	0.8	0.7	0.6	0.5	0.6	0.6	0.6	0.6	1.7	1.7	1.7	1.7	1.9	1.9
80.	*	0.9	1.	1.	0.9	0.9	1.	1.	0.9	0.8	0.8	0.9	0.9	0.9	0.9	0.9	1.	1.	1.1	1.1	1.2
90.	*	0.6	0.8	0.9	0.9	0.9	0.9	0.8	0.7	0.8	0.9	0.9	0.9	0.9	0.9	0.4	0.4	0.5	0.6	0.6	0.6
100.	*	0.6	0.7	0.7	0.7	0.8	0.8	0.9	0.9	0.9	0.9	1.	1.	1.	0.9	0.2	0.2	0.2	0.2	0.2	0.3
110.	*	0.7	0.6	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.1	0.1	0.1	0.1	0.2	0.2
120.	*	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.7	0.1	0.1	0.1	0.1	0.1	0.2
130.	*	0.9	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.	0.	0.	0.	0.1	0.1
140.	*	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.	0.	0.	0.	0.	0.

```
150.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6     0.     0.
0.     0.     0.     0.
160.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.5     0.     0.
0.     0.     0.     0.
170.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.4     0.     0.
0.     0.     0.     0.
180.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.2     0.     0.
0.     0.     0.     0.
190.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.5    0.1     0.     0.
0.     0.     0.     0.
200.  *    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.7    0.6    0.5    0.3     0.     0.     0.
0.     0.    0.1    0.1
210.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.5    0.5    0.3     0.     0.    0.1
0.1    0.1    0.1    0.2
220.  *    0.8    0.8    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.6    0.6    0.3    0.1     0.     0.    0.1
0.1    0.1    0.2    0.2
230.  *    0.9    0.9    0.9    0.9    0.8    0.8    0.6    0.6    0.6    0.5    0.3    0.2    0.1     0.    0.1    0.1
0.2    0.2    0.2    0.2
240.  *    0.7    0.7    0.7    0.7    0.7    0.6    0.6    0.5    0.4    0.3    0.2    0.2    0.1     0.    0.2    0.3
0.3    0.4    0.4    0.5
250.  *    0.6    0.6    0.6    0.5    0.5    0.5    0.3    0.3    0.3    0.3    0.2    0.2    0.1     0.    0.3    0.4
0.5    0.7    0.8    0.8
260.  *    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.3    0.2    0.2    0.2    0.2    0.1     0.    0.5    0.6
0.9     1.    1.2    1.2
270.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1    0.1    0.1     0.     0.    0.6    0.8
1.    1.1    1.3    1.5
280.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.    0.7     1.
1.1    1.2    1.4    1.4
290.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.    0.8     1.
1.1    1.2    1.2    1.2
300.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.    0.8     1.
1.1    1.1    1.1    1.2
310.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.9     1.
1.     1.    1.2    1.2
320.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.8     1.
1.     1.     1.     1.
330.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.8    0.9
0.9    0.9    0.9    0.9
340.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.9    0.9
0.9    0.9    0.9    0.9
```

```
 350.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.9    0.9
 0.9    0.9    0.9    0.9
 360.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     1.1     1.
 1.     1.     1.     1.

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    0.9     1.     1.    0.9    0.9     1.     1.    0.9    0.9    0.9     1.     1.     1.    0.9    1.7    1.7
 1.7    1.7    1.9    1.9
 DEGR. *     80     80     80     80     80     80     80     80    100     90    100    100    100     80     70     70
 70     60     70     70
```



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      MODEL RESULTS
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      REMARKS : In search of the angle corresponding to
                the maximum concentration, only the first
                angle, of the angles with same maximum
                concentrations, is indicated as maximum.

 WIND ANGLE RANGE:    .-360.

 WIND  * CONCENTRATION
 ANGLE *      (PPM)
 (DEGR)* REC61  REC62  REC63  REC64  REC65  REC66  REC67  REC68  REC69  REC70  REC71  REC72  REC73  REC74  REC75  REC76
 REC77  REC78  REC79  REC80

 ------*-----------------------------------------------------------------------------------------------------------------
 ---------------------
    .  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9     1.    0.9    0.9    0.9    0.8    0.8     1.
   1.1    1.1     1.     1.
  10.  *     1.    1.1     1.     1.     1.    0.9    0.9     1.    1.1    1.1     1.     1.    0.5    0.8    0.9     1.
  1.1    1.1     1.     1.
  20.  *    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.3     1.    0.5    0.3    0.8    0.9    1.2
  1.1     1.     1.    0.9
  30.  *    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.1    1.2    1.2    0.8    0.5    0.3     1.    1.1    1.1
  1.1    1.1     1.     1.
  40.  *    1.4    1.4    1.4    1.4    1.2    1.3    1.2    1.3    1.3    1.1    0.8    0.6    0.6     1.    1.1    1.1
  1.1    1.1    1.1     1.
```

```
 50.  *    1.6    1.4    1.4    1.4    1.4    1.5    1.6    1.7    1.6    1.1    0.9    0.6    0.6     1.     1.1    1.2
 1.2    1.1    1.1    1.1
 60.  *    1.9     2.    1.9     2.     2.    1.8    1.9    1.7    1.4    1.1    0.7    0.7    0.8    0.8    0.9     1.
 1.1     1.     1.     1.
 70.  *     2.    1.9    1.8    1.8    1.8    1.7    1.6    1.4    1.4    0.9    0.8    0.6    0.6    0.4    0.5    0.8
 1.     1.    0.9    0.8
 80.  *    1.3    1.2    1.3    1.3    1.3    1.1    1.1     1.    0.7    0.5    0.4    0.3    0.2    0.1    0.3    0.4
 0.6    0.6    0.5    0.5
 90.  *    0.6    0.6    0.6    0.6    0.6    0.4    0.5    0.5    0.4    0.2    0.1    0.1    0.1    0.1    0.1    0.2
 0.3    0.3    0.2    0.2
100.  *    0.3    0.2    0.2    0.3    0.3    0.2    0.2    0.3    0.2    0.2    0.2    0.2    0.3     0.     0.    0.1
0.2    0.1    0.1    0.1
110.  *    0.2    0.2    0.2    0.2    0.3    0.4    0.4    0.4    0.3    0.3    0.3    0.3    0.3     0.     0.    0.1
0.1    0.1    0.1    0.1
120.  *    0.2    0.1    0.2    0.2    0.2    0.3    0.4    0.3    0.3    0.2    0.2    0.2    0.3     0.     0.    0.1
0.1    0.1    0.1    0.1
130.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.2    0.2     0.     0.    0.
0.1    0.1    0.1    0.1
140.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.2    0.2     0.     0.    0.
0.1     0.     0.     0.
150.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1     0.     0.    0.
0.     0.     0.     0.
160.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.
0.1     0.     0.     0.
170.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.1    0.1    0.
0.     0.     0.     0.
180.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.2    0.1    0.1
0.2     0.     0.     0.
190.  *     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.    0.4    0.3    0.1
0.2    0.2    0.2    0.1
200.  *    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.4    0.3    0.4
0.3    0.2    0.2    0.2
210.  *    0.2    0.1    0.2    0.2    0.2    0.1    0.2    0.1    0.1     0.     0.     0.     0.     0.    0.4    0.4    0.4
0.4    0.3    0.2    0.2
220.  *    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.2    0.1     0.     0.     0.     0.     0.    0.3    0.3    0.4
0.4    0.3    0.3    0.2
230.  *    0.3    0.2    0.3    0.3    0.4    0.3    0.3    0.3    0.2    0.1     0.     0.     0.     0.    0.2    0.2    0.3
0.4    0.4    0.3    0.3
240.  *    0.6    0.5    0.6    0.6    0.7    0.6    0.6    0.6    0.4    0.3    0.2     0.     0.     0.    0.3    0.4    0.6
0.8    0.8    0.7    0.6
```

```
 250.  *     1.     1.     1.    1.1    1.1     1.    1.1    1.1    0.9    0.7    0.4    0.3    0.2    0.7    0.7    0.9
 0.9     1.    0.8    0.8
 260.  *    1.3    1.3    1.3    1.5    1.6    1.6    1.6    1.6    1.5    1.1    0.9    0.6    0.5    0.8    0.8     1.
 1.     1.    0.9    1.1
 270.  *    1.5    1.5    1.5    1.7    1.7    1.7    1.7    1.7    1.6    1.4    1.1    0.9    0.9    0.8    0.8     1.
 1.     1.    1.3    1.3
 280.  *    1.4    1.4    1.4    1.5    1.6    1.5    1.6    1.5    1.5    1.3    1.1    0.9    0.9    0.7    0.7    0.8
 1.    0.9    1.2    1.2
 290.  *    1.2    1.3    1.4    1.4    1.4    1.4    1.4    1.4    1.4    1.2     1.    0.9    0.9    0.5    0.5    0.8
 1.    1.1    1.2    1.2
 300.  *    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2    1.2     1.    0.9    0.9    0.7    0.5    0.9    0.9
 1.1    1.1    1.1    1.1
 310.  *    1.2    1.2    1.2    1.2    1.2    1.1    1.1    1.1     1.     1.    0.9    0.7    0.7    0.9    0.9     1.
 1.1    1.1    1.1    1.1
 320.  *     1.    0.9    0.9    0.9    0.9    0.9    0.9    0.9     1.    0.9    0.8    0.7    0.7    0.8    0.8    0.9
 1.1    1.1    1.1    1.1
 330.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.7    0.7    0.8    0.8     1.
 1.1    1.1    1.1    1.1
 340.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.7    0.7    0.7    0.9    0.8     1.
 1.1    1.1    1.1     1.
 350.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.8    0.9    0.7    0.9    0.8     1.
 1.1    1.1    1.1     1.
 360.  *    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9    0.9     1.    0.9    0.9    0.9    0.8    0.8     1.
 1.1    1.1     1.     1.

 ------*-----------------------------------------------------------------------------------------------------------------
 ----------------------
 MAX   *     2.     2.    1.9     2.     2.    1.8    1.9    1.7    1.6    1.4    1.1     1.    0.9     1.    1.1    1.2
 1.2    1.1    1.3    1.3
 DEGR. *     70     60     60     60     60     60     60     50     50    270    270     10      0     30     30     20
 50      0    270    270
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM)															
	*	REC81	REC82	REC83	REC84	REC85	REC86	REC87	REC88	REC89	REC90	REC91	REC92	REC93	REC94	REC95	REC96
REC97	REC98	REC99	REC100														
.	*	1.	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.6	0.3	0.	0.	0.	0.	0.
0.	0.	0.	0.														
10.	*	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.5	0.2	0.	0.	0.	0.	0.
0.	0.	0.	0.														
20.	*	1.	0.9	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.5	0.2	0.	0.	0.	0.1	0.1
0.1	0.1	0.1	0.1														
30.	*	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.4	0.3	0.	0.	0.1	0.1	0.1
0.1	0.1	0.1	0.1														
40.	*	1.	1.	1.	1.	1.	0.8	0.8	0.8	0.7	0.4	0.3	0.	0.	0.1	0.1	0.1
0.1	0.1	0.1	0.1														
50.	*	1.	0.9	0.9	0.9	0.8	0.9	0.8	0.8	0.6	0.4	0.3	0.	0.	0.1	0.1	0.1
0.2	0.2	0.2	0.2														
60.	*	0.9	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.5	0.3	0.3	0.	0.1	0.2	0.2	0.2
0.2	0.3	0.3	0.3														
70.	*	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.4	0.2	0.2	0.1	0.2	0.3	0.4	0.4
0.4	0.5	0.5	0.5														
80.	*	0.4	0.4	0.5	0.4	0.4	0.4	0.3	0.4	0.3	0.1	0.1	0.2	0.3	0.4	0.5	0.5
0.6	0.7	0.7	0.7														
90.	*	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.3	0.2	0.	0.	0.3	0.4	0.5	0.6	0.6
0.8	0.8	0.9	0.9														
100.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.	0.	0.2	0.3	0.4	0.5	0.8
0.9	0.9	0.9	1.														
110.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.2	0.4	0.5	0.6	0.7
0.7	0.8	0.8	0.8														
120.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.2	0.4	0.5	0.6	0.7
0.8	0.8	0.8	0.8														
130.	*	0.	0.	0.1	0.	0.	0.	0.	0.1	0.1	0.	0.	0.2	0.4	0.5	0.7	0.8
0.8	0.8	0.8	0.8														
140.	*	0.	0.	0.	0.	0.	0.	0.	0.1	0.1	0.	0.	0.2	0.4	0.5	0.7	0.8
0.7	0.7	0.7	0.7														

```
150.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.2    0.4    0.6    0.7    0.7
0.7    0.7    0.7    0.7
160.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.3    0.5    0.6    0.7    0.7
0.7    0.7    0.7    0.7
170.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.     0.     0.3    0.6    0.7    0.7    0.7
0.7    0.7    0.7    0.7
180.  *     0.     0.     0.     0.     0.     0.     0.     0.1    0.1    0.1    0.     0.5    0.7    0.8    0.7    0.7
0.7    0.7    0.7    0.7
190.  *     0.     0.    0.1    0.1     0.    0.1     0.    0.1    0.1    0.1    0.     0.6    0.8    0.8    0.8    0.8
0.8    0.8    0.8    0.9
200.  *    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.1    0.     0.6    0.8    0.8    0.8    0.8
0.8    0.8    0.8    0.9
210.  *    0.2    0.2    0.2    0.2    0.1    0.1    0.1    0.2    0.1    0.1    0.1    0.8    0.9    0.9    0.9    0.9
0.8    0.8    0.9     1.
220.  *    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.2    0.2    0.2    0.1    0.9     1.     1.     1.     1.
1.     1.    1.1    1.2
230.  *    0.3    0.2    0.3    0.2    0.2    0.2    0.2    0.4    0.4    0.4    0.3     1.     1.    1.1    1.1     1.
1.    1.1    1.2    1.3
240.  *    0.5    0.4    0.5    0.4    0.4    0.5    0.4    0.6    0.6    0.6    0.5    1.2    1.2    1.2    1.3    1.2
1.2    1.3    1.5    1.8
250.  *    0.8    0.8    0.9     1.    0.9    0.9    0.9    1.2    1.2    1.2     1.    1.1    1.1     1.     1.     1.
1.1    1.2    1.4    1.5
260.  *    1.1    1.2    1.4    1.4    1.2    1.2    1.2    1.5    1.4    1.4    1.3    0.7    0.6    0.6    0.6    0.7
0.7    0.7    0.8    0.9
270.  *    1.1    1.1    1.2    1.1    1.2    1.3    1.3    1.5    1.5    1.4    1.2    0.2    0.2    0.3    0.4    0.4
0.4    0.4    0.4    0.5
280.  *    1.2    1.3    1.3    1.2    1.2    1.2    1.2    1.3    1.3    1.3    1.1    0.1    0.1    0.1    0.1    0.1
0.1    0.2    0.2    0.2
290.  *    1.2    1.2    1.2    1.2    1.1    1.1     1.    1.2    1.1    1.1    0.9    0.1    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
300.  *    1.1    1.1     1.     1.    1.1    0.9     1.    0.8    0.8    0.8    0.6     0.    0.1    0.1    0.1    0.1
0.1    0.1    0.1    0.1
310.  *    1.1     1.     1.     1.    0.9    0.8    0.8    0.8    0.8    0.8    0.6     0.     0.    0.1    0.1    0.1
0.1    0.1    0.1    0.1
320.  *     1.     1.     1.    0.9    0.8    0.8    0.8    0.8    0.8    0.8    0.5     0.     0.     0.     0.     0.
0.     0.     0.     0.
330.  *     1.     1.    0.9    0.9    0.8    0.8    0.8    0.7    0.8    0.7    0.4     0.     0.     0.     0.     0.
0.     0.     0.     0.
340.  *     1.     1.    0.9    0.8    0.8    0.8    0.8    0.7    0.7    0.7    0.4     0.     0.     0.     0.     0.
0.     0.     0.     0.
```

```
 350.  *     1.    0.9    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.7    0.3     0.     0.     0.     0.     0.
 0.     0.     0.     0.
 360.  *     1.    0.9    0.8    0.8    0.8    0.8    0.8    0.7    0.7    0.6    0.3     0.     0.     0.     0.     0.
 0.     0.     0.     0.

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.2    1.3    1.4    1.4    1.2    1.3    1.3    1.5    1.5    1.4    1.3    1.2    1.2    1.2    1.3    1.2
 1.2    1.3    1.5    1.8
 DEGR. *    280    280    260    260    260    270    270    260    270    260    260    240    240    240    240    240
 240    240    240    240
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

```
WIND ANGLE RANGE:    .-360.

WIND  * CONCENTRATION
ANGLE *      (PPM)
(DEGR)* REC101 REC102 REC103 REC104 REC105 REC106 REC107 REC108 REC109 REC110 REC111 REC112 REC113 REC114 REC115 REC116
REC117 REC118 REC119 REC120

------*-------------------------------------------------------------------------------------------------------------------
---------------------
   .  *     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.     0.6    0.5    0.3    0.3    0.3
   0.3    0.3    0.4    0.5
 10.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.     0.3    0.3    0.3    0.4    0.3
 0.5    0.5    0.5    0.8
 20.  *    0.1    0.1    0.1    0.1    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.3    0.4    0.4    0.3    0.7
 0.7    0.8    0.7     1.
 30.  *    0.1    0.1    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.4    0.5    0.5    0.8    0.8
 0.9    0.8    0.8    1.1
 40.  *    0.1    0.1    0.2    0.2    0.2    0.1    0.1    0.1    0.1    0.1    0.1    0.5    0.7    0.8    0.7    0.8
 0.9    0.9    0.8    0.8
```

```
 50.  *    0.2    0.3    0.3    0.3    0.4    0.3    0.3    0.3    0.3    0.3    0.3    0.7    0.8    0.8    0.8    0.8
 0.8    0.7    0.7    0.7
 60.  *    0.3    0.4    0.5    0.5    0.6    0.5    0.5    0.5    0.5    0.5    0.5    0.8    0.8    0.5    0.7    0.5
 0.6    0.7    0.7    0.6
 70.  *    0.5    0.7    0.9    1.2    1.3     1.     1.    1.1    1.1    1.1    1.2    0.3    0.3    0.4    0.4    0.6
 0.4    0.5    0.5    0.5
 80.  *    0.8    1.1    1.2    1.4    1.6    1.5    1.5    1.5    1.5    1.6    1.6    0.2    0.1    0.2    0.3    0.4
 0.5    0.5    0.5    0.4
 90.  *    0.9    1.3    1.5    1.6    1.8    1.6    1.7    1.7    1.7    1.8    1.9    0.1    0.3    0.3    0.3    0.4
 0.5    0.5    0.5    0.4
100.  *     1.    1.3    1.5    1.6    1.7    1.5    1.5    1.7    1.7    1.7    1.7    0.3    0.3    0.3    0.4    0.5
0.5    0.5    0.4    0.4
110.  *    0.9    1.2    1.3    1.4    1.4    1.6    1.6    1.6    1.6    1.6    1.5    0.3    0.3    0.3    0.4    0.5
0.5    0.4    0.4    0.4
120.  *    0.9    1.2    1.3    1.3    1.4    1.4    1.4    1.4    1.3    1.3    1.3    0.3    0.3    0.4    0.5    0.5
0.4    0.4    0.4    0.5
130.  *    0.9    1.2    1.3    1.3    1.4    1.4    1.4    1.4    1.3    1.3    1.3    0.2    0.2    0.3    0.3    0.4
0.5    0.5    0.5    0.6
140.  *    0.8    1.1    1.1    1.1    1.3    1.3    1.2    1.2    1.2    1.2    1.1    0.2    0.2    0.3    0.3    0.3
0.4    0.4    0.4    0.4
150.  *    0.8    1.2    1.1    1.2    1.2    1.1    1.1    1.1    1.2    1.2    1.1    0.1    0.1    0.1    0.3    0.3
0.4    0.4    0.4    0.4
160.  *    0.9    1.2    1.2    1.3    1.3    1.2    1.2    1.2    1.2    1.4    1.1     0.     0.    0.1    0.1    0.1
0.2    0.2    0.2    0.3
170.  *     1.    1.2    1.2    1.3    1.3    1.2    1.1    1.2    1.3    1.5    1.1     0.     0.     0.     0.     0.
0.1    0.1    0.1    0.2
180.  *    1.1    1.1    1.2    1.2    1.2    1.2    1.2    1.3    1.5    1.3     1.     0.     0.     0.     0.     0.
0.     0.    0.1    0.1
190.  *    1.1    1.2    1.4    1.4    1.4    1.3    1.5    1.6    1.4     1.    0.8     0.     0.     0.     0.     0.
0.     0.     0.    0.1
200.  *    1.4    1.4    1.5    1.5    1.5    1.5    1.5    1.4    1.3    1.1    0.7     0.     0.     0.     0.     0.
0.     0.     0.     0.
210.  *    1.3    1.5    1.5    1.6    1.5    1.6    1.4    1.3    1.1     1.    0.7     0.     0.     0.     0.     0.
0.     0.     0.     0.
220.  *    1.5    1.7    1.6    1.7    1.6    1.5    1.3    1.2    1.2    0.8    0.6     0.     0.     0.     0.     0.
0.     0.     0.     0.
230.  *    1.7    1.8    1.8    1.7    1.7    1.5    1.4    1.3    1.1    1.1    0.9     0.     0.     0.     0.     0.
0.     0.     0.     0.
240.  *     2.     2.    1.9    1.8    1.9    1.7    1.5    1.4    1.3     1.    0.8     0.     0.     0.     0.     0.
0.     0.     0.     0.
```

```
 250.  *    1.6    1.6    1.6    1.6    1.6    1.3    1.1    1.1     1.     1.    0.8    0.2    0.1    0.1     0.     0.
 0.     0.     0.     0.
 260.  *     1.    1.1    1.1    1.1    1.2    0.9    0.8    0.7    0.6    0.6    0.5    0.4    0.3    0.3    0.2    0.1
 0.1    0.     0.     0.
 270.  *    0.5    0.5    0.5    0.6    0.6    0.3    0.3    0.3    0.4    0.3    0.3    0.7    0.6    0.6    0.3    0.3
 0.2    0.2    0.1    0.1
 280.  *    0.3    0.3    0.3    0.3    0.4    0.3    0.3    0.4    0.4    0.4    0.5    0.7    0.7    0.6    0.6    0.5
 0.4    0.3    0.3    0.2
 290.  *    0.2    0.2    0.2    0.2    0.2    0.1    0.4    0.4    0.4    0.3    0.4    0.7    0.7    0.6    0.6    0.5
 0.4    0.4    0.4    0.4
 300.  *    0.2    0.2    0.2    0.2    0.2    0.1    0.2    0.3    0.4    0.3    0.3    0.7    0.6    0.6    0.5    0.4
 0.4    0.4    0.4    0.4
 310.  *    0.1    0.1    0.1    0.1    0.1     0.     0.    0.1    0.1    0.2    0.3    0.6    0.6    0.5    0.4    0.4
 0.4    0.4    0.4    0.4
 320.  *     0.     0.    0.1    0.1    0.1     0.     0.     0.    0.1    0.1    0.1    0.6    0.6    0.4    0.4    0.4
 0.3    0.3    0.3    0.4
 330.  *     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.    0.1    0.7    0.5    0.4    0.4    0.4
 0.3    0.3    0.2    0.3
 340.  *    0.1    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.5    0.5    0.4    0.2    0.2
 0.3    0.2    0.3    0.4
 350.  *     0.    0.1    0.1    0.1    0.1     0.     0.     0.     0.     0.     0.    0.6    0.4    0.4    0.5    0.4
 0.3    0.3    0.3    0.5
 360.  *     0.     0.     0.    0.1    0.1     0.     0.     0.     0.     0.     0.    0.6    0.5    0.3    0.3    0.3
 0.3    0.3    0.4    0.5

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *     2.     2.    1.9    1.8    1.9    1.7    1.7    1.7    1.7    1.8    1.9    0.8    0.8    0.8    0.8    0.8
 0.9    0.9    0.8    1.1
 DEGR. *    240    240    240    240    240    240     90     90     90     90     90     60     50     40     30     30
 30     40     30     30
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND * CONCENTRATION
ANGLE * (PPM)
(DEGR)* REC121 REC122 REC123 REC124 REC125 REC126 REC127 REC128 REC129 REC130 REC131 REC132 REC133 REC134 REC135 REC136 REC137 REC138 REC139 REC140

.	*	0.5	0.6	0.5	0.5	0.6	0.7	0.7	0.7	0.6	0.4	0.4	0.4	0.4	0.6	0.6	0.8	0.9	1.	1.1	1.1
10.	*	1.	0.9	1.	1.	1.	0.9	0.9	0.9	0.8	0.1	0.3	0.3	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8
20.	*	1.1	1.	1.	0.9	1.	0.9	0.9	0.7	0.7	0.1	0.2	0.2	0.3	0.3	0.5	0.6	0.6	0.6	0.6	0.8
30.	*	1.	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.5	0.5	0.7	0.7
40.	*	0.8	0.6	0.6	0.6	0.6	0.5	0.5	0.6	0.3	0.	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.5	0.6
50.	*	0.7	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.	0.	0.	0.	0.1	0.1	0.1	0.1	0.2	0.3	0.4
60.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.3
70.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2
80.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.2
90.	*	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2
100.	*	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2
110.	*	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.	0.	0.	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.2
120.	*	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.1	0.	0.	0.	0.	0.	0.	0.	0.2	0.2	0.2	0.2	0.3
130.	*	0.5	0.5	0.4	0.4	0.4	0.3	0.2	0.1	0.	0.	0.	0.	0.	0.1	0.2	0.2	0.2	0.3	0.3	0.3
140.	*	0.4	0.4	0.4	0.4	0.4	0.2	0.2	0.1	0.	0.	0.	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.6

150.	*	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.	0.	0.1	0.2	0.4	0.4	0.5	0.6
0.7	0.8	0.9	0.9														
160.	*	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.	0.1	0.2	0.5	0.5	0.6	0.8	0.9
1.	1.	1.1	1.1														
170.	*	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.	0.2	0.4	0.6	0.7	0.8	0.9	1.
1.1	1.2	1.2	1.3														
180.	*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.	0.	0.3	0.5	0.7	0.7	0.9	1.	1.1
1.1	1.1	1.1	1.3														
190.	*	0.1	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.3	0.5	0.7	0.8	0.8	0.9	0.9
0.9	0.9	0.9	1.1														
200.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.4	0.5	0.7	0.8	0.8	0.8	0.8
0.8	0.8	0.8	1.														
210.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.4	0.5	0.7	0.7	0.7	0.7	0.7
0.7	0.7	0.7	0.9														
220.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.3	0.5	0.7	0.7	0.7	0.7	0.7
0.7	0.6	0.7	0.9														
230.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.3	0.5	0.6	0.6	0.6	0.6	0.6
0.6	0.6	0.7	0.9														
240.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.5	0.6	0.6	0.6	0.6	0.6	0.6
0.6	0.6	0.8	0.9														
250.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.5	0.6	0.6	0.6	0.6	0.6	0.6
0.6	0.6	0.8	0.9														
260.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.5	0.6	0.6	0.6	0.6	0.6	0.6
0.6	0.6	0.9	0.9														
270.	*	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.5	0.6	0.6	0.6	0.6	0.6	0.6
0.7	0.7	1.1	1.1														
280.	*	0.2	0.1	0.1	0.1	0.	0.	0.	0.	0.	0.5	0.6	0.6	0.7	0.7	0.8	0.9
0.9	0.8	1.2	1.3														
290.	*	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.	0.7	0.8	0.8	0.9	0.9	0.9	0.9
1.	1.2	1.3	1.3														
300.	*	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.9	0.9	0.9	0.9	0.9	1.1	1.
1.	1.2	1.4	1.4														
310.	*	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.9	1.	1.	0.9	0.9	0.9	1.
1.	1.2	1.3	1.5														
320.	*	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.9	1.	1.	1.1	1.2	1.2	1.1
1.3	1.3	1.3	1.3														
330.	*	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	1.	1.1	1.1	1.1	1.1	1.3	1.4
1.4	1.5	1.5	1.3														
340.	*	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.8	0.9	0.9	0.9	1.	1.1	1.2
1.3	1.4	1.4	1.2														

```
 350.  *    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.5    0.4    0.6    0.7    0.7    0.8    0.9     1.
 1.    1.1    1.2    1.2
 360.  *    0.5    0.6    0.5    0.5    0.6    0.7    0.7    0.7    0.6    0.4    0.4    0.4    0.4    0.6    0.6    0.8
 0.9     1.    1.1    1.1

 ------*-------------------------------------------------------------------------------------------------------------------
 ---------------------
 MAX   *    1.1     1.     1.     1.     1.    0.9    0.9    0.9    0.8     1.    1.1    1.1    1.1    1.2    1.3    1.4
 1.4    1.5    1.5    1.5
 DEGR. *     20     20     10     10     10     10     10     10     10    330    330    330    320    320    330    330
 330    330    330    310
```

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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: .-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) REC141	REC142	REC143	REC144	REC145	REC146
.	* 0.8	0.6	0.7	0.7	0.8	0.8
10.	* 0.7	0.5	0.5	0.7	0.8	0.8
20.	* 0.5	0.6	0.6	0.6	0.8	0.9
30.	* 0.5	0.5	0.5	0.7	0.7	0.9
40.	* 0.4	0.5	0.5	0.7	0.7	0.7
50.	* 0.3	0.4	0.4	0.5	0.6	0.9
60.	* 0.2	0.2	0.2	0.3	0.5	0.7
70.	* 0.	0.	0.1	0.2	0.2	0.3
80.	* 0.	0.	0.	0.	0.	0.1
90.	* 0.	0.	0.	0.	0.	0.
100.	* 0.	0.	0.	0.	0.	0.
110.	* 0.	0.	0.	0.	0.	0.
120.	* 0.	0.	0.	0.	0.	0.

130.	*	0.2	0.	0.	0.	0.	0.
140.	*	0.2	0.1	0.	0.	0.	0.
150.	*	0.6	0.2	0.2	0.	0.	0.
160.	*	0.8	0.6	0.3	0.2	0.1	0.
170.	*	1.2	0.9	0.8	0.5	0.3	0.1
180.	*	1.2	1.	0.9	0.7	0.6	0.4
190.	*	1.2	1.	0.9	0.8	0.7	0.5
200.	*	1.1	0.9	0.8	0.8	0.7	0.5
210.	*	1.	0.9	0.8	0.8	0.6	0.4
220.	*	1.	0.8	0.8	0.7	0.6	0.3
230.	*	0.9	0.8	0.8	0.6	0.3	0.3
240.	*	0.9	0.8	0.7	0.5	0.3	0.3
250.	*	0.9	0.8	0.7	0.6	0.4	0.6
260.	*	1.	1.	0.9	0.7	0.6	0.8
270.	*	1.2	1.1	0.8	0.9	0.8	0.9
280.	*	1.3	1.2	0.9	1.	0.7	0.6
290.	*	1.4	1.1	0.9	0.9	0.7	0.5
300.	*	1.3	1.1	0.8	0.5	0.4	0.4
310.	*	1.	0.9	0.6	0.5	0.4	0.5
320.	*	1.2	1.	0.7	0.4	0.7	0.8
330.	*	1.1	0.7	0.6	0.4	0.5	0.7
340.	*	0.8	0.4	0.2	0.4	0.5	0.7
350.	*	0.7	0.6	0.6	0.6	0.7	0.7
360.	*	0.8	0.6	0.7	0.7	0.8	0.8
MAX	*	1.4	1.2	0.9	1.	0.8	0.9
DEGR.	*	290	280	180	280	0	20

THE HIGHEST CONCENTRATION OF 2.00 ppm OCCURRED AT RECEPTOR REC62.

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Construction Emissions
Summary

Construction Task		NOx	CO	SO2	PM10	PM2.5	VOC	CO2
		lbs/task	lbs/task	lbs/task	lbs/task	lbs/task	lbs/task	lbs/task
Mobilize	Exhaust	14.90	233.71	0.41	0.18	0.16	11.10	1999.88
	Fugitive	0.00	0.00	0.00	0.88	0.09	0.00	0.00
Total		**14.90**	**233.71**	**0.41**	**1.06**	**0.25**	**11.10**	**1999.88**
Install erosion and sedimentation control measures	Exhaust	14.90	233.71	0.41	0.18	0.16	11.10	1999.88
	Fugitive	0.00	0.00	0.00	0.88	0.09	0.00	0.00
Total		**14.90**	**233.71**	**0.41**	**1.06**	**0.25**	**11.10**	**1999.88**
Perform clearing and grubbing.	Exhaust	1896.14	1092.79	2.87	187.98	182.34	228.76	339337.36
	Fugitive	0.00	0.00	0.00	1037.64	103.80	0.00	0.00
Total		**1896.14**	**1092.79**	**2.87**	**1225.62**	**286.14**	**228.76**	**339337.36**
Install topsoil and seed grubbed locations	Exhaust	2326.41	1105.59	3.28	173.11	167.92	201.09	385247.94
	Fugitive	0.00	0.00	0.00	1203.95	459.88	0.00	0.00
Total		**2326.41**	**1105.59**	**3.28**	**1377.06**	**627.80**	**201.09**	**385247.94**
Remove topsoil and organics from under proposed paved areas	Exhaust	668.74	369.49	0.91	58.16	56.42	69.67	106228.48
	Fugitive	0.00	0.00	0.00	288.95	110.37	0.00	0.00
Total		**668.74**	**369.49**	**0.91**	**347.11**	**166.79**	**69.67**	**106228.48**
Remove excess material in cut locations	Exhaust	87.11	63.63	0.11	9.96	9.66	13.36	12495.91
	Fugitive	0.00	0.00	0.00	95.38	23.32	0.00	0.00
Total		**87.11**	**63.63**	**0.11**	**105.33**	**32.98**	**13.36**	**12495.91**
Install drainage structures	Exhaust	25.79	25.41	0.03	4.01	3.89	5.49	3126.87
	Fugitive	0.00	0.00	0.00	17.61	1.78	0.00	0.00
Total		**25.79**	**25.41**	**0.03**	**21.62**	**5.67**	**5.49**	**3126.87**
Install granular subbase material	Exhaust	261.31	132.44	0.37	21.50	20.85	25.52	43843.05
	Fugitive	0.00	0.00	0.00	292.32	77.66	0.00	0.00
Total		**261.31**	**132.44**	**0.37**	**313.82**	**98.51**	**25.52**	**43843.05**
Install embankment material	Exhaust	960.56	548.13	1.30	85.81	83.24	106.55	151298.82
	Fugitive	0.00	0.00	0.00	928.27	297.11	0.00	0.00
Total		**960.56**	**548.13**	**1.30**	**1014.08**	**380.34**	**106.55**	**151298.82**
Install granular base material	Exhaust	111.99	56.76	0.16	9.21	8.94	10.94	18789.88
	Fugitive	0.00	0.00	0.00	125.28	33.28	0.00	0.00
Total		**111.99**	**56.76**	**0.16**	**134.49**	**42.22**	**10.94**	**18789.88**
Perform Fine Grading	Exhaust	33.88	14.53	0.05	2.62	2.54	2.74	6296.40
	Fugitive	0.00	0.00	0.00	68.86	17.41	0.00	0.00
Total		**33.88**	**14.53**	**0.05**	**71.48**	**19.95**	**2.74**	**6296.40**
Install pavement	Exhaust	109.37	95.78	0.13	14.98	14.53	21.29	14494.31
	Fugitive	0.00	0.00	0.00	81.69	38.69	0.00	0.00
Total		**109.37**	**95.78**	**0.13**	**96.67**	**53.22**	**21.29**	**14494.31**
Install lights and signs	Exhaust	68.98	715.70	1.27	2.71	2.61	35.38	9417.25
	Fugitive	0.00	0.00	0.00	2.65	0.27	0.00	0.00
Total		**68.98**	**715.70**	**1.27**	**5.36**	**2.87**	**35.38**	**9417.25**
Install topsoil	Exhaust	232.64	110.56	0.33	17.31	16.79	20.11	38524.79
	Fugitive	0.00	0.00	0.00	120.39	45.99	0.00	0.00
Total		**232.64**	**110.56**	**0.33**	**137.71**	**62.78**	**20.11**	**38524.79**
Install grass seed, fertilizer and tackifier.	Exhaust	6.37	661.49	0.48	0.50	0.46	43.79	2341.79
	Fugitive	0.00	0.00	0.00	13.17	1.32	0.00	0.00
Total		**6.37**	**661.49**	**0.48**	**13.67**	**1.78**	**43.79**	**2341.79**
Install pavement markings	Exhaust	18.95	10.10	0.02	1.44	1.40	1.50	2344.01
	Fugitive	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		**18.95**	**10.10**	**0.02**	**1.45**	**1.40**	**1.50**	**2344.01**
Restore disturbed areas	Exhaust	34.90	16.58	0.05	2.60	2.52	3.02	5778.72
	Fugitive	0.00	0.00	0.00	29.07	13.06	0.00	0.00
Total		**34.90**	**16.58**	**0.05**	**31.66**	**15.58**	**3.02**	**5778.72**
Demobilize.	Exhaust	3.70	4.03	0.00	0.62	0.60	0.96	416.02
	Fugitive	0.00	0.00	0.00	7.87	0.79	0.00	0.00
Total		**3.70**	**4.03**	**0.00**	**8.49**	**1.39**	**0.96**	**416.02**
	Exhaust	6877	5490	12	593	575	812	1143981
	Fugitive	0	0	0	4315	1225	0	0
Grand Total	**lbs**	**6877**	**5490**	**12**	**4908**	**1800**	**812**	**1143981**
	tons	**3.44**	**2.75**	**0.01**	**2.45**	**0.90**	**0.41**	**571.99**

Construction Task		Equipment	Number	SCC Code	NONROAD Description	Fuel	Days/task	NOx exhaust	NOx	NOx	CO exhaust	CO	CO
								g/hr/unit	lb/day	lb/task	g/hr/unit	lb/day	lb/task
Mobilize		1 pickup truck	1	2265002081	Other Construction Equipment	Gasoline	2	337.921	7.450	14.900	5300.426	116.855	233.710
Install erosion and sedimentation control measures		1 pickup truck	1	2265002081	Other Construction Equipment	Gasoline	2	337.921	7.450	14.900	5300.426	116.855	233.710
Perform clearing and grubbing.		2 Excavator	2	2270002036	Excavators	Diesel	120	274.534	12.105	1452.592	115.196	5.079	609.514
		4 Dump Truck	4	2270002078	Dumpers/Tenders	Diesel	120	41.914	3.696	443.546	45.668	4.027	483.271
Install topsoil and seed grubbed locations	400 CY per day.	2 Dump Truck	2	2270002078	Dumpers/Tenders	Diesel	100	41.914	1.848	184.811	45.668	2.014	201.363
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	100	485.703	21.416	2141.597	205.074	9.042	904.227
Remove topsoil and organics from under proposed paved areas	400 CY per day.	2 Dump Truck	2	2270002078	Dumpers/Tenders	Diesel	24	41.914	1.848	44.355	45.668	2.014	48.327
		2 Loader	2	2270002066	Tractors/Loaders/Backhoes	Diesel	24	104.332	4.600	110.406	98.414	4.339	104.145
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	24	485.703	21.416	513.983	205.074	9.042	217.014
Remove excess material in cut locations	2,500 CY per day.	7 Dump Truck	7	2270002078	Dumpers/Tenders	Diesel	4	41.914	6.468	25.874	45.668	7.048	28.191
		2 Loader	2	2270002066	Tractors/Loaders/Backhoes	Diesel	4	104.332	4.600	18.401	98.414	4.339	17.357
		1 Dozer	1	2270002069	Crawler Tractor/Dozers	Diesel	4	485.703	10.708	42.832	205.074	4.521	18.085
Install drainage structures		1 Dump Truck	1	2270002078	Dumpers/Tenders	Diesel	8	41.914	0.924	7.392	45.668	1.007	8.055
		1 Backhoe Loader	1	2270002066	Tractors/Loaders/Backhoes	Diesel	8	104.332	2.300	18.401	98.414	2.170	17.357
Install granular subbase material	1,000 CY per day.	5 Dump Truck	5	2270002078	Dumpers/Tenders	Diesel	7	41.914	4.620	32.342	45.668	5.034	35.239
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	7	485.703	21.416	149.912	205.074	9.042	63.296
		1 Grader	1	2270002048	Graders	Diesel	7	324.730	7.159	50.114	120.798	2.663	18.642
		1 Roller	1	2270002015	Rollers	Diesel	7	187.527	4.134	28.940	98.936	2.181	15.268
Install embankment material	1,600 CY per day.	7 Dump Truck	7	2270002078	Dumpers/Tenders	Diesel	30	41.914	6.468	194.051	45.668	7.048	211.431
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	30	485.703	21.416	642.479	205.074	9.042	271.268
		1 Roller	1	2270002015	Rollers	Diesel	30	187.527	4.134	124.028	98.936	2.181	65.435
Install granular base material	1,000 CY per day.	5 Dump Truck	5	2270002078	Dumpers/Tenders	Diesel	3	41.914	4.620	13.861	45.668	5.034	15.102
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	3	485.703	21.416	64.248	205.074	9.042	27.127
		1 Grader	1	2270002048	Graders	Diesel	3	324.730	7.159	21.477	120.798	2.663	7.989
		1 Roller	1	2270002015	Rollers	Diesel	3	187.527	4.134	12.403	98.936	2.181	6.544
Perform Fine Grading	5,000 SY per day	1 Grader	1	2270002048	Graders	Diesel	3	324.730	7.159	21.477	120.798	2.663	7.989
		1 Roller	1	2270002015	Rollers	Diesel	3	187.527	4.134	12.403	98.936	2.181	6.544
Install pavement	1,200 Tons per day	25 Dump Truck	25	2270002078	Dumpers/Tenders	Diesel	3	41.914	23.101	69.304	45.668	25.170	75.511
		1 Paver	1	2270002003	Pavers	Diesel	3	230.728	5.087	15.260	108.529	2.393	7.178
		1 Vibratory Roller	1	2270002015	Rollers	Diesel	3	187.527	4.134	12.403	98.936	2.181	6.544
		1 Pneumatic Roller	1	2270002015	Rollers	Diesel	3	187.527	4.134	12.403	98.936	2.181	6.544
Install lights and signs		1 Ditch Trencher	1	2270002030	Trenchers	Diesel	6	183.583	4.047	24.284	110.182	2.429	14.575
		1 pickup truck	1	2265002081	Other Construction Equipment	Gasoline	6	337.921	7.450	44.700	5300.426	116.855	701.130
Install topsoil	400 CY per day.	2 Dump Truck	2	2270002078	Dumpers/Tenders	Diesel	10	41.914	1.848	18.481	45.668	2.014	20.136
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	10	485.703	21.416	214.160	205.074	9.042	90.423
Install grass seed, fertilizer and tackifier.	2 Acres/day	1 hydroseeder	1	2265004076	Other Lawn & Garden Eqp.	Gasoline	30	9.628	0.212	6.368	1000.153	22.050	661.491
Install pavement markings		1 Paint Striper	1	2270002024	Surfacing Equipment	Diesel	3	286.512	6.317	18.950	152.635	3.365	10.095
Restore disturbed areas		1 Dump Truck	1	2270002078	Dumpers/Tenders	Diesel	3	41.914	0.924	2.772	45.668	1.007	3.020
		1 Dozer	1	2270002069	Crawler Tractor/Dozers	Diesel	3	485.703	10.708	32.124	205.074	4.521	13.563
Demobilize.		4 Flat bed tractors with trailer	4	2270002078	Dumpers/Tenders	Diesel	1	41.914	3.696	3.696	45.668	4.027	4.027

	lb/day	lbs		lb/day	lbs
Total Emissions	**317.877**	**6876.628**		**546.545**	**5490.438**
		tons			**tons**
		3.438			**2.745**

Construction Emissions
Tailpipe

Construction Task		Equipment	Number	SCC Code	NONROAD Description	Fuel	Days/task	SO2 exhaust	SO2	SO2	PM10 exhaust	PM10	PM10
								g/hr/unit	lb/day	lb/task	g/hr/unit	lb/day	lb/task
Mobilize		1 pickup truck	1	2265002081	Other Construction Equipment	Gasoline	2	9.347	0.206	0.412	4.067	0.090	0.179
Install erosion and sedimentation control measures		1 pickup truck	1	2265002081	Other Construction Equipment	Gasoline	2	9.347	0.206	0.412	4.067	0.090	0.179
Perform clearing and grubbing.		2 Excavator	2	2270002036	Excavators	Diesel	120	0.457	0.020	2.419	21.449	0.946	113.490
		4 Dump Truck	4	2270002078	Dumpers/Tenders	Diesel	120	0.043	0.004	0.451	7.039	0.621	74.490
Install topsoil and seed grubbed locations	400 CY per day.	2 Dump Truck	2	2270002078	Dumpers/Tenders	Diesel	100	0.043	0.002	0.188	7.039	0.310	31.038
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	100	0.701	0.031	3.089	32.221	1.421	142.073
Remove topsoil and organics from under proposed paved areas	400 CY per day.	2 Dump Truck	2	2270002078	Dumpers/Tenders	Diesel	24	0.043	0.002	0.045	7.039	0.310	7.449
		2 Loader	2	2270002066	Tractors/Loaders/Backhoes	Diesel	24	0.116	0.005	0.122	15.702	0.692	16.617
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	24	0.701	0.031	0.741	32.221	1.421	34.098
Remove excess material in cut locations	2,500 CY per day.	7 Dump Truck	7	2270002078	Dumpers/Tenders	Diesel	4	0.043	0.007	0.026	7.039	1.086	4.345
		2 Loader	2	2270002066	Tractors/Loaders/Backhoes	Diesel	4	0.116	0.005	0.020	15.702	0.692	2.769
		1 Dozer	1	2270002069	Crawler Tractor/Dozers	Diesel	4	0.701	0.015	0.062	32.221	0.710	2.841
Install drainage structures		1 Dump Truck	1	2270002078	Dumpers/Tenders	Diesel	8	0.043	0.001	0.008	7.039	0.155	1.242
		1 Backhoe Loader	1	2270002066	Tractors/Loaders/Backhoes	Diesel	8	0.116	0.003	0.020	15.702	0.346	2.769
Install granular subbase material	1,000 CY per day.	5 Dump Truck	5	2270002078	Dumpers/Tenders	Diesel	7	0.043	0.005	0.033	7.039	0.776	5.432
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	7	0.701	0.031	0.216	32.221	1.421	9.945
		1 Grader	1	2270002048	Graders	Diesel	7	0.542	0.012	0.084	23.634	0.521	3.647
		1 Roller	1	2270002015	Rollers	Diesel	7	0.263	0.006	0.041	16.026	0.353	2.473
Install embankment material	1,600 CY per day.	7 Dump Truck	7	2270002078	Dumpers/Tenders	Diesel	30	0.043	0.007	0.197	7.039	1.086	32.589
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	30	0.701	0.031	0.927	32.221	1.421	42.622
		1 Roller	1	2270002015	Rollers	Diesel	30	0.263	0.006	0.174	16.026	0.353	10.599
Install granular base material	1,000 CY per day.	5 Dump Truck	5	2270002078	Dumpers/Tenders	Diesel	3	0.043	0.005	0.014	7.039	0.776	2.328
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	3	0.701	0.031	0.093	32.221	1.421	4.262
		1 Grader	1	2270002048	Graders	Diesel	3	0.542	0.012	0.036	23.634	0.521	1.563
		1 Roller	1	2270002015	Rollers	Diesel	3	0.263	0.006	0.017	16.026	0.353	1.060
Perform Fine Grading	5,000 SY per day	1 Grader	1	2270002048	Graders	Diesel	3	0.542	0.012	0.036	23.634	0.521	1.563
		1 Roller	1	2270002015	Rollers	Diesel	3	0.263	0.006	0.017	16.026	0.353	1.060
Install pavement	1,200 Tons per day	25 Dump Truck	25	2270002078	Dumpers/Tenders	Diesel	3	0.043	0.023	0.070	7.039	3.880	11.639
		1 Paver	1	2270002003	Pavers	Diesel	3	0.346	0.008	0.023	18.471	0.407	1.222
		1 Vibratory Roller	1	2270002015	Rollers	Diesel	3	0.263	0.006	0.017	16.026	0.353	1.060
		1 Pneumatic Roller	1	2270002015	Rollers	Diesel	3	0.263	0.006	0.017	16.026	0.353	1.060
Install lights and signs		1 Ditch Trencher	1	2270002030	Trenchers	Diesel	6	0.228	0.005	0.030	16.450	0.363	2.176
		1 pickup truck	1	2265002081	Other Construction Equipment	Gasoline	6	9.347	0.206	1.236	4.067	0.090	0.538
Install topsoil	400 CY per day.	2 Dump Truck	2	2270002078	Dumpers/Tenders	Diesel	10	0.043	0.002	0.019	7.039	0.310	3.104
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	10	0.701	0.031	0.309	32.221	1.421	14.207
Install grass seed, fertilizer and tackifier.	2 Acres/day	1 hydroseeder	1	2265004076	Other Lawn & Garden Eqp.	Gasoline	30	0.729	0.016	0.482	0.754	0.017	0.499
Install pavement markings		1 Paint Striper	1	2270002024	Surfacing Equipment	Diesel	3	0.312	0.007	0.021	21.832	0.481	1.444
Restore disturbed areas		1 Dump Truck	1	2270002078	Dumpers/Tenders	Diesel	3	0.043	0.001	0.003	7.039	0.155	0.466
		1 Dozer	1	2270002069	Crawler Tractor/Dozers	Diesel	3	0.701	0.015	0.046	32.221	0.710	2.131
Demobilize.		4 Flat bed tractors with trailer	4	2270002078	Dumpers/Tenders	Diesel	1	0.043	0.004	0.004	7.039	0.621	0.621

	lb/day	lbs		lb/day	lbs
Total Emissions	**1.035**	**12.179**		**27.929**	**592.889**
		tons			**tons**
		0.006			**0.296**

Construction Emissions
Tailpipe

Construction Task		Equipment	Number	SCC Code	NONROAD Description	Fuel	Days/task	PM25 exhaust	PM2.5	PM2.5	Total VOC	VOC	VOC
								g/hr/unit	lb/day	lb/task	g/hr/unit	lb/day	lb/task
Mobilize		1 pickup truck	1	2265002081	Other Construction Equipment	Gasoline	2	3.742	0.082	0.165	251.789	5.551	11.102
Install erosion and sedimentation control measures		1 pickup truck	1	2265002081	Other Construction Equipment	Gasoline	2	3.742	0.082	0.165	251.789	5.551	11.102
Perform clearing and grubbing.		2 Excavator	2	2270002036	Excavators	Diesel	120	20.806	0.917	110.085	21.445	0.946	113.468
		4 Dump Truck	4	2270002078	Dumpers/Tenders	Diesel	120	6.828	0.602	72.255	10.895	0.961	115.296
Install topsoil and seed grubbed locations	400 CY per day.	2 Dump Truck	2	2270002078	Dumpers/Tenders	Diesel	100	6.828	0.301	30.106	10.895	0.480	48.040
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	100	31.255	1.378	137.811	34.710	1.530	153.047
Remove topsoil and organics from under proposed paved areas	400 CY per day.	2 Dump Truck	2	2270002078	Dumpers/Tenders	Diesel	24	6.828	0.301	7.226	10.895	0.480	11.530
		2 Loader	2	2270002066	Tractors/Loaders/Backhoes	Diesel	24	15.231	0.672	16.118	20.236	0.892	21.414
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	24	31.255	1.378	33.075	34.710	1.530	36.731
Remove excess material in cut locations	2,500 CY per day.	7 Dump Truck	7	2270002078	Dumpers/Tenders	Diesel	4	6.828	1.054	4.215	10.895	1.681	6.726
		2 Loader	2	2270002066	Tractors/Loaders/Backhoes	Diesel	4	15.231	0.672	2.686	20.236	0.892	3.569
		1 Dozer	1	2270002069	Crawler Tractor/Dozers	Diesel	4	31.255	0.689	2.756	34.710	0.765	3.061
Install drainage structures		1 Dump Truck	1	2270002078	Dumpers/Tenders	Diesel	8	6.828	0.151	1.204	10.895	0.240	1.922
		1 Backhoe Loader	1	2270002066	Tractors/Loaders/Backhoes	Diesel	8	15.231	0.336	2.686	20.236	0.446	3.569
Install granular subbase material	1,000 CY per day.	5 Dump Truck	5	2270002078	Dumpers/Tenders	Diesel	7	6.828	0.753	5.269	10.895	1.201	8.407
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	7	31.255	1.378	9.647	34.710	1.530	10.713
		1 Grader	1	2270002048	Graders	Diesel	7	22.925	0.505	3.538	26.021	0.574	4.016
		1 Roller	1	2270002015	Rollers	Diesel	7	15.545	0.343	2.399	15.421	0.340	2.380
Install embankment material	1,600 CY per day.	7 Dump Truck	7	2270002078	Dumpers/Tenders	Diesel	30	6.828	1.054	31.612	10.895	1.681	50.442
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	30	31.255	1.378	41.343	34.710	1.530	45.914
		1 Roller	1	2270002015	Rollers	Diesel	30	15.545	0.343	10.281	15.421	0.340	10.199
Install granular base material	1,000 CY per day.	5 Dump Truck	5	2270002078	Dumpers/Tenders	Diesel	3	6.828	0.753	2.258	10.895	1.201	3.603
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	3	31.255	1.378	4.134	34.710	1.530	4.591
		1 Grader	1	2270002048	Graders	Diesel	3	22.925	0.505	1.516	26.021	0.574	1.721
		1 Roller	1	2270002015	Rollers	Diesel	3	15.545	0.343	1.028	15.421	0.340	1.020
Perform Fine Grading	5,000 SY per day	1 Grader	1	2270002048	Graders	Diesel	3	22.925	0.505	1.516	26.021	0.574	1.721
		1 Roller	1	2270002015	Rollers	Diesel	3	15.545	0.343	1.028	15.421	0.340	1.020
Install pavement	1,200 Tons per day	25 Dump Truck	25	2270002078	Dumpers/Tenders	Diesel	3	6.828	3.763	11.290	10.895	6.005	18.015
		1 Paver	1	2270002003	Pavers	Diesel	3	17.917	0.395	1.185	18.680	0.412	1.235
		1 Vibratory Roller	1	2270002015	Rollers	Diesel	3	15.545	0.343	1.028	15.421	0.340	1.020
		1 Pneumatic Roller	1	2270002015	Rollers	Diesel	3	15.545	0.343	1.028	15.421	0.340	1.020
Install lights and signs		1 Ditch Trencher	1	2270002030	Trenchers	Diesel	6	15.956	0.352	2.111	15.661	0.345	2.072
		1 pickup truck	1	2265002081	Other Construction Equipment	Gasoline	6	3.742	0.082	0.495	251.789	5.551	33.306
Install topsoil	400 CY per day.	2 Dump Truck	2	2270002078	Dumpers/Tenders	Diesel	10	6.828	0.301	3.011	10.895	0.480	4.804
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	10	31.255	1.378	13.781	34.710	1.530	15.305
Install grass seed, fertilizer and tackifier.	2 Acres/day	1 hydroseeder	1	2265004076	Other Lawn & Garden Eqp.	Gasoline	30	0.694	0.015	0.459	66.207	1.460	43.789
Install pavement markings		1 Paint Striper	1	2270002024	Surfacing Equipment	Diesel	3	21.177	0.467	1.401	22.614	0.499	1.496
Restore disturbed areas		1 Dump Truck	1	2270002078	Dumpers/Tenders	Diesel	3	6.828	0.151	0.452	10.895	0.240	0.721
		1 Dozer	1	2270002069	Crawler Tractor/Dozers	Diesel	3	31.255	0.689	2.067	34.710	0.765	2.296
Demobilize.		4 Flat bed tractors with trailer	4	2270002078	Dumpers/Tenders	Diesel	1	6.828	0.602	0.602	10.895	0.961	0.961

	lb/day	lbs		lb/day	lbs
Total Emissions	**27.077**	**575.033**		**52.632**	**812.360**
		tons			**tons**
		0.288			**0.406**

Construction Emissions
Tailpipe

Construction Task		Equipment	Number	SCC Code	NONROAD Description	Fuel	Days/task	CO2 Exhaust	CO2	CO2
								g/hr/unit	lb/day	lb/task
Mobilize		1 pickup truck	1	2265002081	Other Construction Equipment	Gasoline	2	45356.368	999.942	1999.884
Install erosion and sedimentation control measures		1 pickup truck	1	2265002081	Other Construction Equipment	Gasoline	2	45356.368	999.942	1999.884
Perform clearing and grubbing.		2 Excavator	2	2270002036	Excavators	Diesel	120	54698.219	2411.791	289414.944
		4 Dump Truck	4	2270002078	Dumpers/Tenders	Diesel	120	4717.565	416.020	49922.420
Install topsoil and seed grubbed locations	400 CY per day.	2 Dump Truck	2	2270002078	Dumpers/Tenders	Diesel	100	4717.565	208.010	20801.008
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	100	82654.741	3644.469	364446.928
Remove topsoil and organics from under proposed paved areas	400 CY per day.	2 Dump Truck	2	2270002078	Dumpers/Tenders	Diesel	24	4717.565	208.010	4992.242
		2 Loader	2	2270002066	Tractors/Loaders/Backhoes	Diesel	24	13011.398	573.707	13768.978
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	24	82654.741	3644.469	87467.263
Remove excess material in cut locations	2,500 CY per day.	7 Dump Truck	7	2270002078	Dumpers/Tenders	Diesel	4	4717.565	728.035	2912.141
		2 Loader	2	2270002066	Tractors/Loaders/Backhoes	Diesel	4	13011.398	573.707	2294.830
		1 Dozer	1	2270002069	Crawler Tractor/Dozers	Diesel	4	82654.741	1822.235	7288.939
Install drainage structures		1 Dump Truck	1	2270002078	Dumpers/Tenders	Diesel	8	4717.565	104.005	832.040
		1 Backhoe Loader	1	2270002066	Tractors/Loaders/Backhoes	Diesel	8	13011.398	286.854	2294.830
Install granular subbase material	1,000 CY per day.	5 Dump Truck	5	2270002078	Dumpers/Tenders	Diesel	7	4717.565	520.025	3640.176
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	7	82654.741	3644.469	25511.285
		1 Grader	1	2270002048	Graders	Diesel	7	64773.068	1428.009	9996.064
		1 Roller	1	2270002015	Rollers	Diesel	7	30426.340	670.789	4695.526
Install embankment material	1,600 CY per day.	7 Dump Truck	7	2270002078	Dumpers/Tenders	Diesel	30	4717.565	728.035	21841.059
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	30	82654.741	3644.469	109334.078
		1 Roller	1	2270002015	Rollers	Diesel	30	30426.340	670.789	20123.684
Install granular base material	1,000 CY per day.	5 Dump Truck	5	2270002078	Dumpers/Tenders	Diesel	3	4717.565	520.025	1560.076
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	3	82654.741	3644.469	10933.408
		1 Grader	1	2270002048	Graders	Diesel	3	64773.068	1428.009	4284.028
		1 Roller	1	2270002015	Rollers	Diesel	3	30426.340	670.789	2012.368
Perform Fine Grading	5,000 SY per day	1 Grader	1	2270002048	Graders	Diesel	3	64773.068	1428.009	4284.028
		1 Roller	1	2270002015	Rollers	Diesel	3	30426.340	670.789	2012.368
Install pavement	1,200 Tons per day	25 Dump Truck	25	2270002078	Dumpers/Tenders	Diesel	3	4717.565	2600.126	7800.378
		1 Paver	1	2270002003	Pavers	Diesel	3	40357.291	889.731	2669.192
		1 Vibratory Roller	1	2270002015	Rollers	Diesel	3	30426.340	670.789	2012.368
		1 Pneumatic Roller	1	2270002015	Rollers	Diesel	3	30426.340	670.789	2012.368
Install lights and signs		1 Ditch Trencher	1	2270002030	Trenchers	Diesel	6	25836.445	569.599	3417.594
		1 pickup truck	1	2265002081	Other Construction Equipment	Gasoline	6	45356.368	999.942	5999.652
Install topsoil	400 CY per day.	2 Dump Truck	2	2270002078	Dumpers/Tenders	Diesel	10	4717.565	208.010	2080.101
		2 Dozer	2	2270002069	Crawler Tractor/Dozers	Diesel	10	82654.741	3644.469	36444.693
Install grass seed, fertilizer and tackifier.	2 Acres/day	1 hydroseeder	1	2265004076	Other Lawn & Garden Eqp.	Gasoline	30	3540.708	78.060	2341.790
Install pavement markings		1 Paint Striper	1	2270002024	Surfacing Equipment	Diesel	3	35440.724	781.338	2344.015
Restore disturbed areas		1 Dump Truck	1	2270002078	Dumpers/Tenders	Diesel	3	4717.565	104.005	312.015
		1 Dozer	1	2270002069	Crawler Tractor/Dozers	Diesel	3	82654.741	1822.235	5466.704
Demobilize.		4 Flat bed tractors with trailer	4	2270002078	Dumpers/Tenders	Diesel	1	4717.565	416.020	416.020

	lb/day	lbs
Total Emissions	**49744.990**	**1143981.369**
		tons
		571.991

CONSTANTS

13.2.4 PM10 k-factor	0.35	Chapter 13.2.4	Mean Moisture %	7.9	Table 11.9-3
13.2.4 PM2.5 k-factor	0.053	Chapter 13.2.4	Silt Content %	6.9	Table 11.9-3
13.2.2 PM10 k-factor	1.5	Chapter 13.2.2	Mean Wind Speed (mph)	7.411	calculated 2005-2006
13.2.2 PM2.5 k-factor	0.15	Chapter 13.2.2	Grader Speed (mph)	7.1	Table 11.9-3
13.2.2 PM10 a-factor	0.9	Chapter 13.2.2	Loaded HDD Truck Weight (tons)	35	
13.2.2 PM2.5 a-factor	0.9	Chapter 13.2.2	UN-Loaded HDDTruck Weight (tons)	10	
13.2.2 PM10 b-factor	0.45	Chapter 13.2.2	LDG Truck Weigth (tons)	2.76	F150 4X4 Super Cab 5.0V8 GVWR (empty)
13.2.2 PM2.5 b-factor	0.45	Chapter 13.2.2	Distance from site to town road (miles)	0.5	measured
			Workday (hrs/day)	10	
			Soil Density. 1 CY = ? Tons	1.75	

Mobilize

		1 Pickup Truck Transport Ch. 13.2.2 Eq. #1a	
		PM10	PM2.5
		lb/VMT	lb/VMT
		0.878	0.088
		0.5	VMT/day
		0.439	0.044
		lb/day	lb/day
PM10	PM2.5	2	days/task
0.878	0.088	0.878	0.088
lb/task	lb/task	lb/task	lb/task

Install erosion and sedimentation control measures

		1 Pickup Truck Transport Ch. 13.2.2 Eq. #1a	
		PM10	PM2.5
		lb/VMT	lb/VMT
		0.878	0.088
		0.5	VMT/day
		0.439	0.044
		lb/day	lb/day
PM10	PM2.5	2	days/task
0.878	0.088	0.878	0.088
lb/task	lb/task	lb/task	lb/task

Perform clearing and grubbing.

		4 Dump Trucks Unloaded Hauling IN Ch. 13.2.2 Eq. #1a		2 Excavators Loading Ch. 13.2.4 Eq. #1		4 Dump Trucks Loaded Hauling OUT Ch. 13.2.2 Eq. #1a	
		PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
		lb/VMT	lb/VMT	lb/ton	lb/ton	lb/VMT	lb/VMT
		1.567	0.157	2.73E-04	4.13E-05	2.754	0.275
		2.0	VMT/day	20.0	tons/day	2.0	VMT/day
		3.134	0.313	0.005	0.001	5.507	0.551
		lb/day	lb/day	lb/day	lb/day	lb/day	lb/day
PM10	PM2.5	120	days/task	120	days/task	120	days/task
1037.642	103.798	376.096	37.610	0.655	0.099	660.891	66.089
lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task

Install topsoil and seed grubbed locations

400 CY per day.

		2 Dump Trucks Loaded Hauling IN Ch. 13.2.2 Eq. #1a		2 Dump Trucks Unloading Ch. 13.2.4 Eq. #1		2 Dozers Earthmoving Table 11.9-1 Bulldozing		2 Dump Trucks Unloaded Hauling OUT Ch. 13.2.2 Eq. #1a	
		PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
		lb/VMT	lb/VMT	lb/ton	lb/ton	lb/hr	lb/hr	lb/VMT	lb/VMT
		2.754	0.275	2.73E-04	4.13E-05	0.753	0.414	1.567	0.157
		1.0	VMT/day	700.0	tons/day	10.0	hrs/day	1.0	VMT/day
		2.754	0.275	0.191	0.029	7.528	4.138	1.567	0.157
		lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day
PM10	PM2.5	100	days/task	100	days/task	100	days/task	100	days/task
1203.949	459.880	275.371	27.537	19.110	2.894	752.761	413.778	156.707	15.671
lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task

Remove topsoil and organics from under proposed paved areas

400 CY per day.

		2 Dozers Earthmoving Table 11.9-1 Bulldozing		2 Dump Trucks Unloaded Hauling IN Ch. 13.2.2 Eq. #1a		2 Loaders Loading Ch. 13.2.4 Eq. #1		2 Dump Trucks Loaded Hauling OUT Ch. 13.2.2 Eq. #1a	
		PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
		lb/hr	lb/hr	lb/VMT	lb/VMT	lb/ton	lb/ton	lb/VMT	lb/VMT
		0.753	0.414	1.567	0.157	2.73E-04	4.13E-05	2.754	0.275
		10.0	hrs/day	1.0	VMT/day	700.0	tons/day	1.0	VMT/day
		7.528	4.138	1.567	0.157	0.191	0.029	2.754	0.275
		lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day
PM10	PM2.5	24	days/task	24	days/task	24	days/task	24	days/task
288.948	110.371	180.663	99.307	37.610	3.761	4.586	0.695	66.089	6.609
lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task

Remove excess material in cut locations

2,500 CY per day.

		7 Dump Trucks Unloaded Hauling IN Ch. 13.2.2 Eq. #1a		1 Dozer Earthmoving Table 11.9-1 Bulldozing		2 Loaders Loading Ch. 13.2.4 Eq. #1		7 Dump Trucks Loaded Hauling OUT Ch. 13.2.2 Eq. #1a	
		PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
		lb/VMT	lb/VMT	lb/hr	lb/hr	lb/ton	lb/ton	lb/VMT	lb/VMT
		1.567	0.157	0.753	0.414	2.73E-04	4.13E-05	2.754	0.275
		3.5	VMT/day	10.0	hrs/day	4375.0	tons/day	3.5	VMT/day
		5.485	0.548	7.528	4.138	1.194	0.181	9.638	0.964
		lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day
PM10	PM2.5	4	days/task	4	days/task	4	days/task	4	days/task
95.379	23.324	21.939	2.194	30.110	16.551	4.777	0.723	38.552	3.855
lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task

Install drainage structures

		1 Dump Truck Loaded Hauling IN Ch. 13.2.2 Eq. #1a		1 Backhoe Loader Loading Ch. 13.2.4 Eq. #1		1 Dump Truck Unloaded Hauling OUT Ch. 13.2.2 Eq. #1a	
		PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
		lb/VMT	lb/VMT	lb/ton	lb/ton	lb/VMT	lb/VMT
		2.754	0.275	2.73E-04	4.13E-05	1.567	0.157
		0.5	VMT/day	150.0	tons/day	0.5	VMT/day
		1.377	0.138	0.041	0.006	0.784	0.078
		lb/day	lb/day	lb/day	lb/day	lb/day	lb/day
PM10	PM2.5	8	days/task	8	days/task	8	days/task
17.611	1.778	11.015	1.101	0.328	0.050	6.268	0.627
lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task

Install granular subbase material

1,000 CY per day.

			5 Dump Trucks Loaded Hauling IN Ch. 13.2.2 Eq. #1a		5 Dump Trucks Unloading Ch. 13.2.4 Eq. #1		5 Dump Trucks Unloaded Hauling OUT Ch. 13.2.2 Eq. #1a		2 Dozers Earthmoving Table 11.9-1 Bulldozing		1 Grader Grading Table 11.9-1 Grading		1 Roller Compacting Table 11.9-1 Bulldozing	
			PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
			lb/VMT	lb/VMT	lb/ton	lb/ton	lb/VMT	lb/VMT	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
			2.754	0.275	2.73E-04	4.13E-05	1.567	0.157	0.753	0.414	1.543	0.167	0.753	0.414
			2.5	VMT/day	1750.0	tons/day	2.5	VMT/day	10.0	hrs/day	10.0	hrs/day	10.0	hrs/day
			6.884	0.688	0.478	0.072	3.918	0.392	7.528	4.138	15.425	1.666	7.528	4.138
			lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day
	PM10	PM2.5	7	days/task	7	days/task	7	days/task	7	days/task	7	days/task	7	days/task
	292.323	77.656	48.190	4.819	3.344	0.506	27.424	2.742	52.693	28.964	107.978	11.659	52.693	28.964
	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task

Install embankment material

1,600 CY per day.

			7 Dump Trucks Loaded Hauling IN Ch. 13.2.2 Eq. #1a		7 Dump Trucks Unloading Ch. 13.2.4 Eq. #1		7 Dump Trucks Unloaded Hauling OUT Ch. 13.2.2 Eq. #1a		2 Dozers Earthmoving Table 11.9-1 Bulldozing		1 Roller Compacting Table 11.9-1 Bulldozing	
			PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
			lb/VMT	lb/VMT	lb/ton	lb/ton	lb/VMT	lb/VMT	lb/hr	lb/hr	lb/hr	lb/hr
			2.754	0.275	2.73E-04	4.13E-05	1.567	0.157	0.753	0.414	0.753	0.414
			3.5	VMT/day	2800.0	tons/day	3.5	VMT/day	10.0	hrs/day	10.0	hrs/day
			9.638	0.964	0.764	0.116	5.485	0.548	7.528	4.138	7.528	4.138
			lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day
	PM10	PM2.5	30	days/task	30	days/task	30	days/task	30	days/task	30	days/task
	928.270	297.108	289.140	28.914	22.932	3.473	164.542	16.454	225.828	124.134	225.828	124.134
	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task

Install granular base material

1,000 CY per day.

			5 Dump Trucks Loaded Hauling IN Ch. 13.2.2 Eq. #1a		5 Dump Trucks Unloading Ch. 13.2.4 Eq. #1		5 Dump Trucks Unloaded Hauling OUT Ch. 13.2.2 Eq. #1a		2 Dozers Earthmoving Table 11.9-1 Bulldozing		1 Grader Grading Table 11.9-1 Grading		1 Roller Compacting Table 11.9-1 Bulldozing	
			PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
			lb/VMT	lb/VMT	lb/ton	lb/ton	lb/VMT	lb/VMT	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
			2.754	0.275	2.73E-04	4.13E-05	1.567	0.157	0.753	0.414	1.543	0.167	0.753	0.414
			2.5	VMT/day	1750.0	tons/day	2.5	VMT/day	10.0	hrs/day	10.0	hrs/day	10.0	hrs/day
			6.884	0.688	0.478	0.072	3.918	0.392	7.528	4.138	15.425	1.666	7.528	4.138
			lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day
	PM10	PM2.5	3	days/task	3	days/task	3	days/task	3	days/task	3	days/task	3	days/task
	125.281	33.281	20.653	2.065	1.433	0.217	11.753	1.175	22.583	12.413	46.276	4.997	22.583	12.413
	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task

Perform Fine Grading

5,000 SY per day

			1 Grader Grading Table 11.9-1 Grading		1 Roller Compacting Table 11.9-1 Bulldozing	
			PM10	PM2.5	PM10	PM2.5
			lb/hr	lb/hr	lb/hr	lb/hr
			1.543	0.167	0.753	0.414
			10.0	hrs/day	10.0	hrs/day
			15.425	1.666	7.528	4.138
			lb/day	lb/day	lb/day	lb/day
	PM10	PM2.5	3	days/task	3	days/task
	68.859	17.410	46.276	4.997	22.583	12.413
	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task

Install pavement

1,200 Tons per day

			25 Dump Trucks Loaded Hauling IN Ch. 13.2.2 Eq. #1a		25 Dump Trucks Unloading Ch. 13.2.4 Eq. #1		25 Dump Trucks Unloaded Hauling OUT Ch. 13.2.2 Eq. #1a		1 Paver Compacting Table 11.9-1 Bulldozing		1 Vibratory Roller Compacting Table 11.9-1 Bulldozing		1 Pneumatic Roller Compacting Table 11.9-1 Bulldozing	
			PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
			lb/VMT	lb/VMT	lb/ton	lb/ton	lb/VMT	lb/VMT	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
			2.754	0.275	2.73E-04	4.13E-05	1.567	0.157	0.753	0.414	0.753	0.414	0.753	0.414
			1.0	VMT/day	1200.0	tons/day	1.0	VMT/day	10.0	hrs/day	10.0	hrs/day	10.0	hrs/day
			2.754	0.275	0.328	0.050	1.567	0.157	7.528	4.138	7.528	4.138	7.528	4.138
			lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day
	PM10	PM2.5	3	days/task	3	days/task	3	days/task	3	days/task	3	days/task	3	days/task
	81.694	38.685	8.261	0.826	0.983	0.149	4.701	0.470	22.583	12.413	22.583	12.413	22.583	12.413
	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task

Install lights and signs

			1 Ditch Trencher N/A Ch. 13.2.4 Eq. #1		1 Pickup Truck Transport Ch. 13.2.2 Eq. #1a	
			PM10	PM2.5	PM10	PM2.5
			lb/ton	lb/ton	lb/VMT	lb/VMT
			2.73E-04	4.13E-05	0.878	0.088
			7.0	tons/day	0.5	VMT/day
			0.002	0.000	0.439	0.044
			lb/day	lb/day	lb/day	lb/day
	PM10	PM2.5	6	days/task	6	days/task
	2.645	0.265	0.011	0.002	2.634	0.263
	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task

Install topsoil

400 CY per day.

			2 Dump Trucks Loaded Hauling IN Ch. 13.2.2 Eq. #1a		2 Dump Trucks Unloading Ch. 13.2.4 Eq. #1		2 Dump Trucks Unloaded Hauling OUT Ch. 13.2.2 Eq. #1a		2 Dozers Earthmoving Table 11.9-1 Bulldozing	
			PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
			lb/VMT	lb/VMT	lb/ton	lb/ton	lb/VMT	lb/VMT	lb/hr	lb/hr
			2.754	0.275	2.73E-04	4.13E-05	1.567	0.157	0.753	0.414
			1.0	VMT/day	700.0	tons/day	1.0	VMT/day	10.0	hrs/day
			2.754	0.275	0.191	0.029	1.567	0.157	7.528	4.138
			lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day
	PM10	PM2.5	10	days/task	10	days/task	10	days/task	10	days/task
	120.395	45.988	27.537	2.754	1.911	0.289	15.671	1.567	75.276	41.378
	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task

Install grass seed, fertilizer and tackifier.

2 Acres/day

			1 hydroseeder N/A Ch. 13.2.2 Eq. #1a	
			PM10	PM2.5
			lb/VMT	lb/VMT
			0.878	0.088
			0.5	VMT/day
			0.439	0.044
			lb/day	lb/day
	PM10	PM2.5	30	days/task
	13.170	1.317	13.170	1.317
	lb/task	lb/task	lb/task	lb/task

Install pavement markings

		1 Paint Striper
		N/A
		Ch. 13.2.1 Eq. #1
		PM10	PM2.5
		lb/VMT	lb/VMT
		0.002	0.001
		0.5	VMT/day
		0.001	0.000
		lb/day	lb/day
PM10	PM2.5	3	days/task
0.003	0.001	0.003	0.001
lb/task	lb/task	lb/task	lb/task

Restore disturbed areas

		1 Dump Truck		1 Dump Truck		1 Dump Truck		1 Dozer	
		Loaded Hauling IN		Unloading		Unloaded Hauling OUT		Earthmoving	
		Ch. 13.2.2 Eq. #1a		Ch. 13.2.4 Eq. #1		Ch. 13.2.2 Eq. #1a		Table 11.9-1 Bulldozing	
		PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
		lb/VMT	lb/VMT	lb/ton	lb/ton	lb/VMT	lb/VMT	lb/hr	lb/hr
		2.754	0.275	2.73E-04	4.13E-05	1.567	0.157	0.753	0.414
		0.5	VMT/day	2.0	tons/day	0.5	VMT/day	10.0	hrs/day
		1.377	0.138	0.001	0.000	0.784	0.078	7.528	4.138
		lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day
PM10	PM2.5	3	days/task	3	days/task	3	days/task	3	days/task
29.066	13.062	4.131	0.413	0.002	0.000	2.351	0.235	22.583	12.413
lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task	lb/task

Demobilize.

		4 Flat bed tractors with trailer		4 Flat bed tractors with trailer	
		Unloaded Hauling IN		Loaded Hauling OUT	
		Ch. 13.2.2 Eq. #1a		Ch. 13.2.2 Eq. #1a	
		PM10	PM2.5	PM10	PM2.5
		lb/VMT	lb/VMT	lb/VMT	lb/VMT
		1.567	0.157	2.367	0.237
		2.0	VMT/day	2.0	VMT/day
		3.134	0.313	4.734	0.473
		lb/day	lb/day	lb/day	lb/day
PM10	PM2.5	1	days/task	1	days/task
7.868	0.787	3.134	0.313	4.734	0.473
lb/task	lb/task	lb/task	lb/task	lb/task	lb/task

Construction Total

PM10	PM2.5
4314.857	**1224.886**
lbs	**lbs**
PM10	**PM2.5**
2.157	**0.612**
tons	**tons**

Tino, Vincent

From: Bennett, Marc (DEP) <marc.bennett@state.ma.us>
Sent: Monday, November 26, 2012 11:28 AM
To: Tino, Vincent
Cc: Hewett, David; Wert, Mark (DEP)
Subject: RE: MOVES files

Vincent –

You should continue to use MOBILE6 inputs for any projects that you are working on.

We are still looking into how best to share MOVES inputs/output with consultants for their projects. The big obstacle is file size. Hopefully this will be sorted out early next year.

There will be plenty of communication and advanced notice to you and other consultants when we make the switch to MOVES,

Marc Bennett
MADEP
617-292-5597

From: Tino, Vincent [mailto:vtino@epsilonassociates.com]
Sent: Thursday, November 15, 2012 1:47 PM
To: Wert, Mark (DEP)
Cc: Bennett, Marc (DEP); Hewett, David
Subject: MOVES files

Mark,

I spoke briefly yesterday with Don Cook of EPA regarding the MA-specific MOVES model inputs and he specifically said to speak to you. Typically I speak with Marc Bennett about this stuff so I've CCed him. Are these files available yet? We're working on a NEPA project and EPA's scoping letter required us to use MOVES, but conversation with Don yesterday said it would be your (DEP's) call whether we used MOVES or MOBILE6.

Can you please advise on the availability of MOVES inputs, or give us the go-ahead to use MOBILE6. Thanks.

Sincerely,

Vincent R. Tino, CCM • **Senior Consultant** • **Epsilon Associates, Inc.**
3 Clock Tower Place, Suite 250, Maynard, MA 01754
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e | vtino@epsilonassociates.com **w |** www.epsilonassociates.com
LinkedIn: www.linkedin.com/in/tinovr
Please consider the environment before printing this email.

APPENDIX F WATER SUPPLY

260 West Exchange Street, Suite 300
Providence, Rhode Island 02903
tel: 401-751-5360
fax: 401-274-2173

May 22, 2012

The Honorable Thomas C. Hoye, Jr.
Mayor
Taunton City Hall
141 Oak Street
Taunton, MA, 02780

Subject: Evaluation for the Proposed Mashpee Wampanoag Project First Light

Mayor Hoye:

CDM Smith has completed our evaluation of water supply and fire protection for the Proposed Mashpee Wampanoag Project First Light located off of Stevens Street (at the intersection of routes 24 and 140) in the City of Taunton Main Service Area. We are pleased to present our analyses and results in this report.

Description of Development

The proposed project consists of the phased development of an area of land at the intersection of routes 24 and 140 in the City of Taunton. Whereas there are four proposed phases for construction, this evaluation broke them into two phases for this evaluation. In total the proposed project consists of approximately a 150,000 sq. foot Casino with approximately 300 food court seats, a 145 seat restaurant, a 165 seat restaurant, a 400 seat buffet area, 2500 parking spaces in structured parking and 10 to 12 small retail stores. In addition there will also be three 300 room hotels, a 200 seat coffee shop/restaurant and a indoor/outdoor water park.

For this evaluation, Phase I was modeled to include the demand need at the Main entrance on Stevens Street. This includes the demand for Renovations/Expansion to the Maggiore Buildings, Parking Structure/Transportation Center, 300 Room Resort Hotel, Retail, Future 300 Room Hotel, Future 200 Seat Restaurant/Coffee Shop. The average water usage for Phase I is anticipated at 167,850 gallons per day (GPD). Phase II was modeled to include the demand need at the Future entrance on Hart Street. This includes the demand for the Future Water Park and 300 Room Hotel and Events Center, which is anticipated to be about 47,100 GPD. Table 1 summarizes the flow information received from the JCJ Architecture.

Fay, Spofford & Thorndike, Inc. (FST) has proposed the following two connections to the City of Taunton's Water System for the proposed project.

- Proposed Main Entrance – Stevens Street
- Proposed Emergency Entrance – Hart Street

It is recommended that appropriate water main be provided that loops through the site and connects Stevens Street to Hart Street hydraulically. CDM Smith evaluated the ability of the Taunton Water distribution system to meet current and future water supply requirements of the proposed project at each location (i.e. each connection could provide total development flows if needed). The attached **Figure 1** shows the proposed connection locations.

Evaluation

CDM Smith evaluated the proposed project under two main criteria for water supply. First, we assessed the ability of the existing system to provide adequate pressures to service the project area under domestic day demands (i.e., average day and maximum day flow conditions). Secondly, we evaluated the existing system to provide adequate residual pressures under a maximum day flow with a required fire flow. Under all supply scenarios, CDM Smith also assessed the potential impacts caused by the proposed project on the existing water service customers.

For new facilities, the Massachusetts Department of Environmental Protection (MA DEP) has imposed a standard that the water supply system must provide a minimum pressure of 35 pounds per square inch (psi) under all domestic demand conditions. In addition, the National Fire Protection Association and MA DEP require the pressures throughout the system must remain above 20 psi under maximum day demand with fire flow conditions.

The Taunton Water Division's existing water distribution model was modified to include water service at the proposed main entrance to the project location on Stevens Street and the proposed emergency entrance on Hart Street.

For the proposed main entrance at Stevens Street, a new 16-inch main from Middleboro Avenue to the proposed entrance was modeled to supply water to the site from the main service area within Taunton. A new main was modeled because the entrance on Stevens Street is located within the East Taunton high service area, which is not sized for the demand from the proposed facilities. For the proposed emergency entrance at Hart Street we used an existing node on the 24-inch water main on Hart Street. All results pertain to the proposed water service connections at these locations.

CDM Smith has not evaluated water service, pressure requirements or pressure losses within the site and the proposed facility. Pressure requirements and pressure losses within the future project area and facility are independent of this analysis and being performed by others.

The model was used to examine several water supply and demand conditions. Using the water distribution model, CDM Smith simulated hydraulic conditions in the Main Service Area (MSA) under current system conditions and utilizing proposed demand conditions from JCJ Architecture (**memo attached and summarized in Table 1)**. We have presented a summary of the analyses and our findings below.

Domestic Service

Using the Taunton water distribution model, CDM Smith evaluated water supply to the proposed project area under average day (ADD) and maximum day demands (MDD) conditions. **Table 2 (**attached) presents the existing pressures at the proposed main and emergency entrances to the facility under existing conditions.

Fire Protection

The Insurance Service Office (ISO) conducts hydrant flow tests to evaluate the ability of a distribution system to fight fires. The last time ISO rated the City of Taunton was in October 1999, when 36 tests were performed. ISO defines needed fire flow as the rate of water flow, at a residual pressure of 20 psi for a specified duration, which is necessary to control a major fire in a specific structure. For this evaluation, this addressed available fire flow at the property line. Fire needs within the project area are being evaluated by others.

To conduct the fire flow simulation in the model, CDM Smith set the Prospect Hill Reservoir at its lowest operating level (assumed at 18.5 feet) at the beginning of the fire flow simulation. CDM Smith established the tank elevation as the level where there would be sufficient water in the tank to provide fire flow, while the maximum day demand would be provided by the Harris Street Pump Station and the Taunton Water Treatment Plant High Lift Pumps. By setting the tank at this water surface elevation for the fire flow simulation, we conservatively assume the worst-case scenario where the maximum amount of system demand is being withdrawn.

Results

CDM Smith has evaluated water supply and hydraulic conditions in the distribution system where the proposed project will receive water supply from the City. Pressure ranges in the Main Service Area for each scenario are shown in **Table 2**. Our evaluation determined that the City's distribution system provides adequate water service for all water supply conditions at the

proposed Emergency Entrance on Hart Street but will not supply adequate pressure utilizing existing mains at the main entrance on Stevens Street. With both existing and future maximum day demands imposed throughout distribution system, CDM Smith simulated a fire flow of 3500 gallons per minute (gpm) for a duration of 3 hours at either the main or emergency entrances to the proposed project location. The fire flow was based on ISO and AWWA M31 requirements. For both entrances, system pressures remained above the 20-psi requirement, as shown in **Table 2**. The addition of a new dedicated 16-inch main from Middleboro Avenue to the proposed entrance is recommended to provide adequate water service for all water supply conditions and fire flow needs at the Main Entrance.

Recommended Capital Improvements

Based on the results, CDM Smith feels that a new dedicated 16-inch water main should be installed from the 24-inch main in Middleboro Avenue down Pinehill Street to the Main entrance on Stevens Street, to adequately supply the requested domestic water and fire protection demands for the proposed project. The City also experiences water quality issues (i.e. "rusty" water complaints) in the Middleboro Avenue, Hart Street and County Street areas that result from water services being connected to aging, smaller mains. Improvements for these customers are recommended to occur concurrently with the required improvements for the proposed project. The following is a summary of the recommended capital improvements:

- 4,500 feet of 16" water main from the intersection of Pinehill Street and Middleboro Ave, to Stevens Street, to the proposed facility entrance (would include appurtenances like a 24" x 16" tapping sleeve and valve, line valves, fittings, hydrants, etc.)

- All existing customers along this 4,500 foot pipe route would be tied over to the new water main to resolve issues associated with multiple pipes within these streets.

- A 24" x16" tapping sleeve and valve with up to 30 feet of 16" water main to the customer property line on Middleboro Ave. This will allow for looping of service line through the customers property.

- Two meter vaults (with bypass) at the identified connection locations.

- Final overlay paving on all of Stevens Street from the customer entrance (Rt 140) to the intersection of Stevens Street and Middleboro Ave, as well as Pinehill Street to Middleboro Ave.

- Police details associated with the construction.
- Replacement of water services on Middleboro Ave, Hart Street and County Street to improve pressure and rectify issues associated with multiple water mains in these streets.
- Engineering design and services during construction.
- Estimated cost for these improvements is $2.0 million.

The City pays for most of their water system improvements through low interest (2%) State Revolving Fund (SRF) loans. At this time, there is not an available loan that would cover these costs and the scope of the project does not ensure funding in future SRF requests. It is therefore assumed that money would need to be borrowed at current market rates for these improvements.

In addition to capital improvements, the proposed customer connection will be supplied from one of the main distribution pipes for the entire City. Based on the importance of this water main and the associated pumping systems at the Taunton Water Treatment Plant that supply it, it is estimated that there will be the need for $20,000 annually for additional operation and maintenance to ensure system dependability to the site and surrounding areas.

Items for Consideration in the Inter-Governmental Agreement (IGA)

In addition to the recommended capital improvements described above, it is recommended that the proposed customer connection be prepared similarly to existing Inter-municipal Agreements (IMAs) that the City has with other consecutive system customers. Based on the existing agreements, the following items are recommended for consideration as part of the IGA negotiations:

- The City is responsible for providing service to the location of master meters at the property limit.
- The consumption measured and recorded by the City master meters located at each entrance facility will be the basis for billing.
- Information provided by the customer indicates they need 220,000 gpd on an annual daily average basis once the facility is constructed to the limits presented to this point

(through Phase 4 based on development plan provided). The City will supply up to 220,000 gpd on an annual daily average basis.

- Assuming the improvements described below are constructed, the City will be able to provide a maximum fire flow of 3500 gpm at 20 psi at the master meter locations.
- The City agrees to provide water quality at the master meter locations that complies with all relevant MA DEP and EPA standards.
- The customer is responsible for water quality, pressure and any site specific needs for all system components beyond the master meter.
- The customer should provide a pipe loop through their property to connect the two service connections before completion of what is identified as Phase 4 in the current development strategy.

It should be noted that information received to date for the proposed project DID NOT include water use related to irrigation needs for the facility. The information provided in this evaluation focused on the needs for use within the facilities and were based on the initial utility estimates provided in the attached letter dated April 13, 2012.

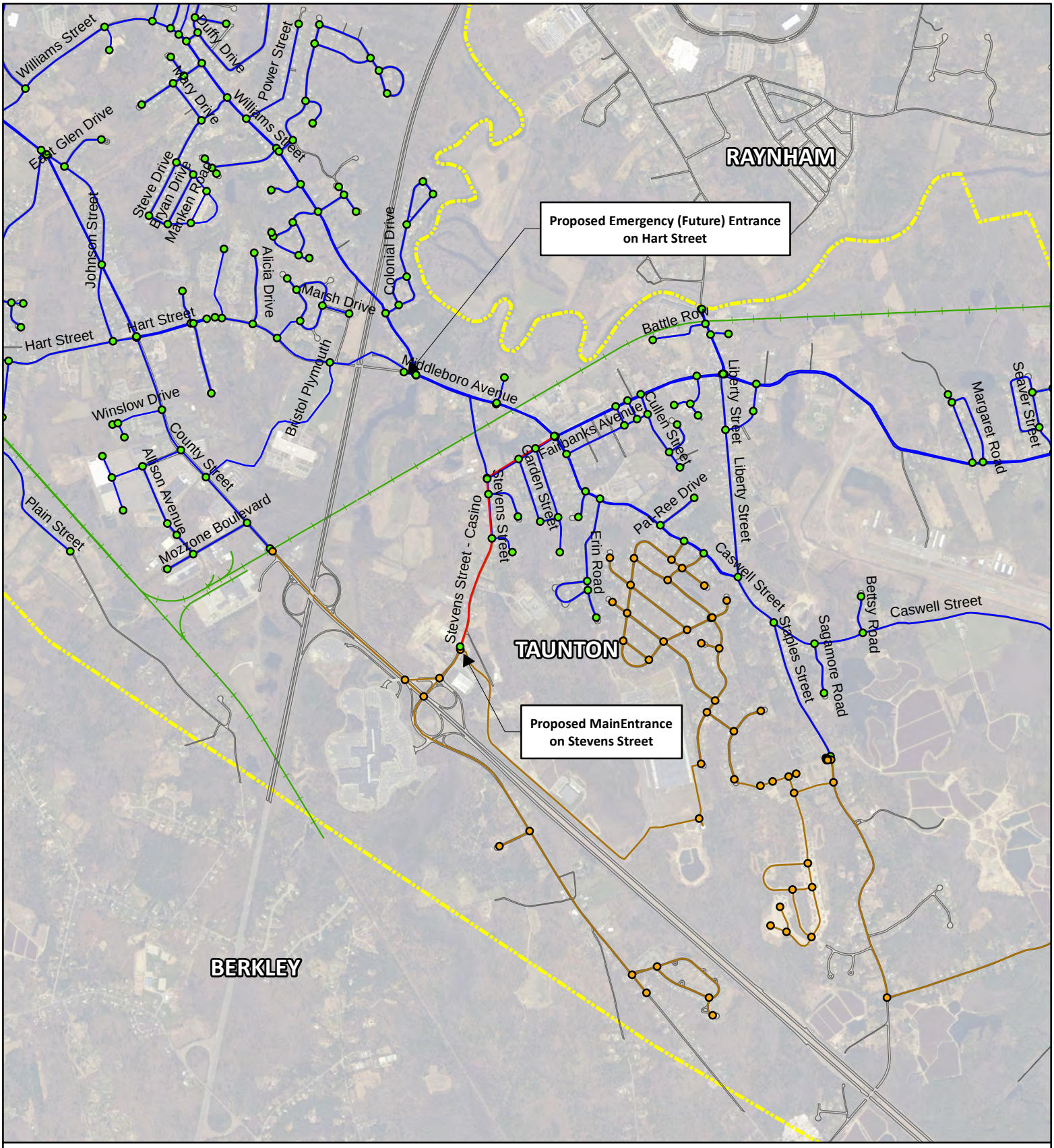
As further information related to type of development and facility needs become available, the developer should have discussions with the City of Taunton Fire Department to determine if a lower available fire flow would be acceptable. If a change occurs in the required demand or supply to the proposed project area, CDM Smith recommends performing additional model runs to reevaluate the new demand to the project area.

CDM Smith appreciates the opportunity to perform this study for the City of Taunton. We trust that this report meets your immediate needs. Should you have any questions or have need of additional services, please call me at (401) 457-0329.

Very truly yours,

Benjamin Levesque, P.E., BCEE
CDM Smith Inc.

cc: F. Adam Yanulis (CDM Smith)
Jason Buffington, Esq. (City of Taunton Law Department)



Legend

Model Junction
- Low Service
- East Taunton HSA

Water Main
- Low Service
- East Taunton HSA
- Proposed 16" Water Main

Road Edge Line

Railroad Center Line

Town Line

City of Taunton
Massachusetts
Water Supply System

0 700 1,400 Feet

N

Figure 1
Mashpee Wampanoag
Water Supply and
Fire Protection Evaluation

CDM Smith

martindm P:\Taunton\Modeling\2012\LSACasinoRun.mxd 4/20/2012

Phase	Buildings	Peak Flow (gpm)	Average Daily Flow (gpd)	Average Daily Flow (gpm)	Peak Hour Flow (gph)	Peak Hour Flow (gpm)
1	Renovations/Expansion to the Maggiore Buildings	250	75,000	52	12,500	208
	Parking Structure/Transportation Center	94	13,000	9	2,200	37
	300 Room Resort Hotel	275	30,000	21	5,000	83
	Retail	67	6,600	5	1,100	18
	Totals	686	124,600	87	20,800	347
2	Future 300 Room Hotel	275	30,000	21	5,000	83
	Future 200 Seat Restaurant / Coffee Shop	75	13,250	9	2,250	38
	Future Water Park and 300 Room Hotel - Hotel	275	30,000	21	5,000	83
	- Water Park	500	17,100	12	2,900	48
	Totals	1,125	90,350	63	15,150	253
	Totals Combined Phase 1 & 2	1,811	214,950	149	35,950	599

Table 1
City of Taunton, Massachusetts
Project First Light
Summary of Water Demands

Water Supply Scenario	Stevens Street Main Entrance[4] Water Demand		Hart Street Emergency Entrance[5] Water Demand		Required Minimum Pressure	Connection at Stevens Street Entrance		Connection at Hart Street Entrance	
						Pressure	Hydraulic Grade Line	Pressure	Hydraulic Grade Line
	(MGD)	(GPM)	(MGD)	(GPM)	(PSI)	(PSI)	(FT)	(PSI)	(FT)
Existing ADD	0.00	0	0	0	35	56	195	69	194
Existing ADD[1] + Phase I [2] & Phase II [3]	0.17	117	0.05	33	35	58	199	71	198
[6] Existing ADD[1] + Phase I [2] & Phase II [3]	0.22	150	0.00	0	35	57	198	71	198
Existing MDD	0.00	0	0.00	0	35	60	205	73	203
Existing MDD[1] + Phase I & Phase II	1.49	1036	1.12	775	35	57	198	71	198
[6] Existing MDD[1] + Phase I & Phase II	2.61	1811	0.00	0	35	57	198	71	199
Existing MDD + Phase II + 3500 gpm fire flow for 3 hours & Phase I	1.49	1036	6.16	4275	20	49	180	63	180
Existing MDD + Phase I + 3500 gpm fire flow for 3 hours & Phase II	6.53	4536	1.12	775	20	29	134	63	180

NOTES:

1. ADD = Average Day Demand; MDD = Maximum Day Demand

2. Phase I was modeled to include the demand need at the Main entrance on Stevens Street. This includes the demand for Renovations/Expansion to the Maggiore Buildings, Parking Structure/Transportation Center, 300 Room Resort Hotel, Retail, Future 300 Room Hotel, Future 200 Seat Restaurant/ Coffee Shop

3. Phase II was modeled to include the demand need at the Future entrance on Hart Street. This includes the demand for the Future Water Park and 300 Room Hotel.

4. The Main Entrance is proposed to be located at the end of Stevens Street. A new 16-inch main from Middleboro Avenue to the entrance was modeled to supply water to the site from the main service area within Taunton.

5. The Future Entrance (Emergency Entrance) is proposed to be located of Hart Street. Demand was modeled off the exiting 24-inch main in Hart Street that is within the main service area in Taunton.

6. Total Demand for Phase I & II are modeled at main entrance at the end of Stevens Street with a 16-inch main looping through the site and connecting Stevens Street to Hart Street.

7. Low pressures below 35 PSI are only found in the highest elevations surrounding the Prospect Hill Tank. These pressures are currently less than 35 PSI and are not the cause of the Phase I Development.

CDM Smith

TABLE 2
City of Taunton, Massachusetts
Mashpee Wampanoag
Water Supply Fire Protection Evaluation

April 13, 2012

Mr. Bill Dow
JCJ Architecture
38 Prospect Street
Hartford, CT 06103

Re: Mashpee Wampanoag Master Planning Project
Taunton, Massachusetts

Dear Bill:

Based on the preliminary program information provided on 4/11/12, we have determined initial utility estimates that can be used for planning purposes. We have broken this information into the major portions of each intended phase of the project. As the program becomes more defined and plans are developed, we can update this information with further detail.

1. Phase 1:
    a. Renovations/Expansion to the Maggiore Buildings:
        i. Electrical:
            1. Normal Power – 8.6 MVA: This would most likely be provided via multiple utility services or bringing in power at the utility supply voltage (medium voltage) and distributing it to unit substations within the facility. Note that all electrical loads listed are connected load estimates as required by the NEC. Actual demands will be less than these estimates.
            2. Generator Power – 4.0 MVA: Multiple medium voltage generators will be provided in parallel.
        ii. Water:
            1. 6” domestic water main
            2. Peak = 250 GPM
            3. Average daily flow – 75,000 Gallons per day
            4. Peak Hour = 12,500 gallons
        iii. Sewer:
            1. 8” sanitary sewer main. This would most likely be broke up into multiple connections once the plans are developed and locations are known of venues and site services.
        iv. Gas:
            1. 46,000 CFH.

b. Parking Structure/Transportation Center:
    i. Electrical:
        1. Normal Power – 0.5 MVA
        2. Generator Power – .2 MVA

    ii. Water:
        1. 3” domestic water main
        2. Peak = 94 GPM
        3. Average daily flow – 13,000 Gallons per day
        4. Peak Hour = 2,200 gallons
    iii. Sewer:
        1. 4” sanitary sewer main.
    iv. Gas:
        1. 500 CFH.

c. Grade Parking:
    i. Electrical:
        1. Normal Power – 0.05 MVA
        2. Generator Power –0.02 MVA
    ii. Water, Sewer, Gas: Not anticipated.

d. 300 Room Resort Hotel:
    i. Electrical:
        1. Normal Power – 3.5 MVA - This would most likely be provided via multiple utility services or bringing in power at the utility supply voltage (medium voltage) and distributing it to unit substations within the facility.
        2. Generator Power – 1.5 MVA – (1) large generator would be utilized, or this could be provided from the casino parallel generator location (and add this capacity to that system). This would be determined during schematics.
    ii. Water:
        1. 6” domestic water main
        2. Peak = 275 GPM
        3. Average daily flow – 30,000 Gallons per day
        4. Peak Hour = 5,000 gallons
    iii. Sewer:
        1. 10” sanitary sewer main, or multiple 6” and 8” connections based on coordination with the civil engineer.
    iv. Gas:
        1. 14,000 CFH.

e. Retail:
    i. Electrical:
        1. Normal Power – 0.5 MVA
        2. Generator Power – 0.07 MVA
    ii. Water:
        1. 3” domestic water main
        2. Peak = 67 GPM
        3. Average daily flow – 6,600 Gallons per day
        4. Peak Hour = 1,100 gallons
    iii. Sewer:
        1. 4” sanitary sewer main
    iv. Gas:
        1. 700 CFH.

2. Phase 2:
    a. Future 300 Room Hotel
        i. Electrical:
            1. Normal Power – 3.5 MVA - This would most likely be provided via multiple utility services or bringing in power at the utility supply voltage (medium voltage) and distributing it to unit substations within the facility.
            2. Generator Power – 1.5 MVA – (1) large generator would be utilized, or this could be provided from the casino parallel generator location (and add this capacity to that system). This would be determined during schematics.
        ii. Water:
            1. 6” domestic water main
            2. Peak = 275 GPM
            3. Average daily flow – 30,000 Gallons per day
            4. Peak Hour = 5,000 gallons
        iii. Sewer:
            1. 10” sanitary sewer main, or multiple 6” and 8” connections based on coordination with the civil engineer.
        iv. Gas:
            1. 14,000 CFH.

    b. Future 200 Seat Restaurant / Coffee Shop:
        i. Electrical:
            1. Normal Power – 0.6 MVA
            2. Generator Power – 0.16 MVA
        ii. Water:
            1. 3” domestic water main
            2. Peak = 75 GPM
            3. Average daily flow – 13,250 Gallons per day
            4. Peak Hour = 2,250 gallons
        iii. Sewer:
            1. 6” sanitary sewer main
        iv. Gas:
            1. 3,300 CFH.

c. Future Water Park and 300 Room Hotel:
    i. Electrical:
        1. Normal Power – 5.5 MVA
        2. Generator Power – 1.9 MVA
    ii. Water:
        1. Hotel
            a. 6" domestic water main
            b. Peak = 275 GPM
            c. Average daily flow – 30,000 Gallons per day
            d. Peak Hour = 5,000 gallons
        2. Park
            a. 8" domestic water main
            b. Peak = 500 GPM
            c. Average daily flow – 17,100 Gallons per day
            d. Peak Hour = 2,900 gallons
    iii. Sewer:
        1. Hotel:
            a. 10" sanitary sewer main, or multiple 6" and 8" connections based on coordination with the civil engineer.
        2. Park:
            a. 12" sanitary main.
    iv. Gas:
        1. 80,000 CFH

d. Future Parking Structure:
    i. Electrical:
        1. Normal Power – 0.5 MVA
        2. Generator Power – .2 MVA
    ii. Water, Sewer, Gas: Not anticipated.

3. <u>Project Totals</u>
    a. Phase 1:
        i. Power:
            1. Total Normal Load: 13.2 MVA.
            2. Total Generator Load: 5.8 MVA.
        ii. Water:
            1. A peak diversified flow of approximately 515 GPM can be anticipated from the above estimates, which can be provided via a 8" line.
        iii. Sewer:
            1. A 14" site sanitary main can be anticipated for the above sanitary estimates.
        iv. Gas:
            1. 61,200 CFH.

b. Phase 1 and 2 combined:
    i. Power:
        1. Total Normal Load: 23.3 MVA. If this is provided at 13.2 kV, this would equate to 1200A, 15kV service entrance gear being required. As noted above, the load estimated is connected load and the actual demand will be significantly less than this estimate.
        2. Total Generator Load: 9.6 MVA. This would require multiple 2.5 MW and 2.0 MW generators in parallel. Locations and quantities would be determined during schematics.
    ii. Water:
        1. A peak diversified flow of approximately 1,400 GPM can be anticipated from the above estimates, which can be provided via a 14" line.
    iii. Note: the above flow is in regards to domestic water use only. In regards to fire protection water, the IFC would require 6000 GPM for a period of four hours for the entire site. An exception allows a reduction of this by 75%. If it is found that a reliable water source is not provided by the utility, a tank of approximately 360,000 gallons could be necessary.
c. Sewer:
    i. A 24" site sanitary main can be anticipated for the above sanitary estimates (entire project)
d. Gas:
    i. 158,500 CFH. Actual demand will be significantly less than this and can be further determined during design. A significant gas load has been carried for the water park at this point, which will most likely be reduced once the full scope is known of this portion.

Please review the above information and do not hesitate to contact our office with any questions.

Sincerely,

Exp U.S. Services, Inc.

Paul R. Van Kauwenberg, P.E.
Principal

BETA
ENGINEERING SUCCESS **TOGETHER**

April 4, 2014

Mr. Justin D. Gould, P.E.
Fay, Spofford & Thorndike
5 Burlington Woods
Burlington, MA 01803

Re: Comment on the Draft Environmental Impact Report
Project First Light - Destination Resort Casino

Dear Mr. Gould:

Comments were recently issued on behalf of the City of Taunton regarding the Draft Environmental Impact Statement for the proposed casino. As stated, Taunton's Comprehensive Wastewater Management Plan has not been finalized as proposed total nitrogen limits were recently imposed in Taunton's draft NPDES permit. Comments on the permit have been filed and to date, the final permit has not been issued by USEPA/MassDEP. However, it is known that some degree of total nitrogen removal will be required at the Taunton WWTF.

Accordingly, process upgrades to accomplish nitrogen removal will be incorporated into the Taunton WWTF. Provided that the proposed casino will generate wastewater at a strength comparable to a typical commercial source (restaurant, hotel, etc.), pretreatment for total nitrogen removal will not be required prior to discharge to the Taunton collection system. Please note that wastewater derived from all kitchen facilities or other food processing areas must enter a grease trap or a grease interceptor prior to discharge.

In regard to future flow allocations through 2025, based on existing known proposed development and infill the average annual flows are not expected to exceed the permitted capacity of 8.4 mgd. The average annual flow is 7.1 mgd and the planned additional flows and infill allowances are estimated at 1.25 mgd for a total of 8.35 mgd. During that time the future upgrade of the wastewater treatment to handle nutrient removal and additional planned flows will be under construction. See the attached Table 4-7 for an explanation of projected wastewater flows.

If I can be of any further assistance regarding this matter, please call me at 401-333-2382.

Sincerely,
BETA Group, Inc.

Joseph Federico, P.E.
Vice President

cc: Fred Cornaglia

BETA GROUP, INC.
6 Blackstone Valley Place, Suite 101, Lincoln, RI 02865
P: 401.333.2382 | F: 401.333.9225 | W: www.BETA-Inc.com

Table 4-7
Estimate Of Projected WWTF Flows Through 2025 (mgd)

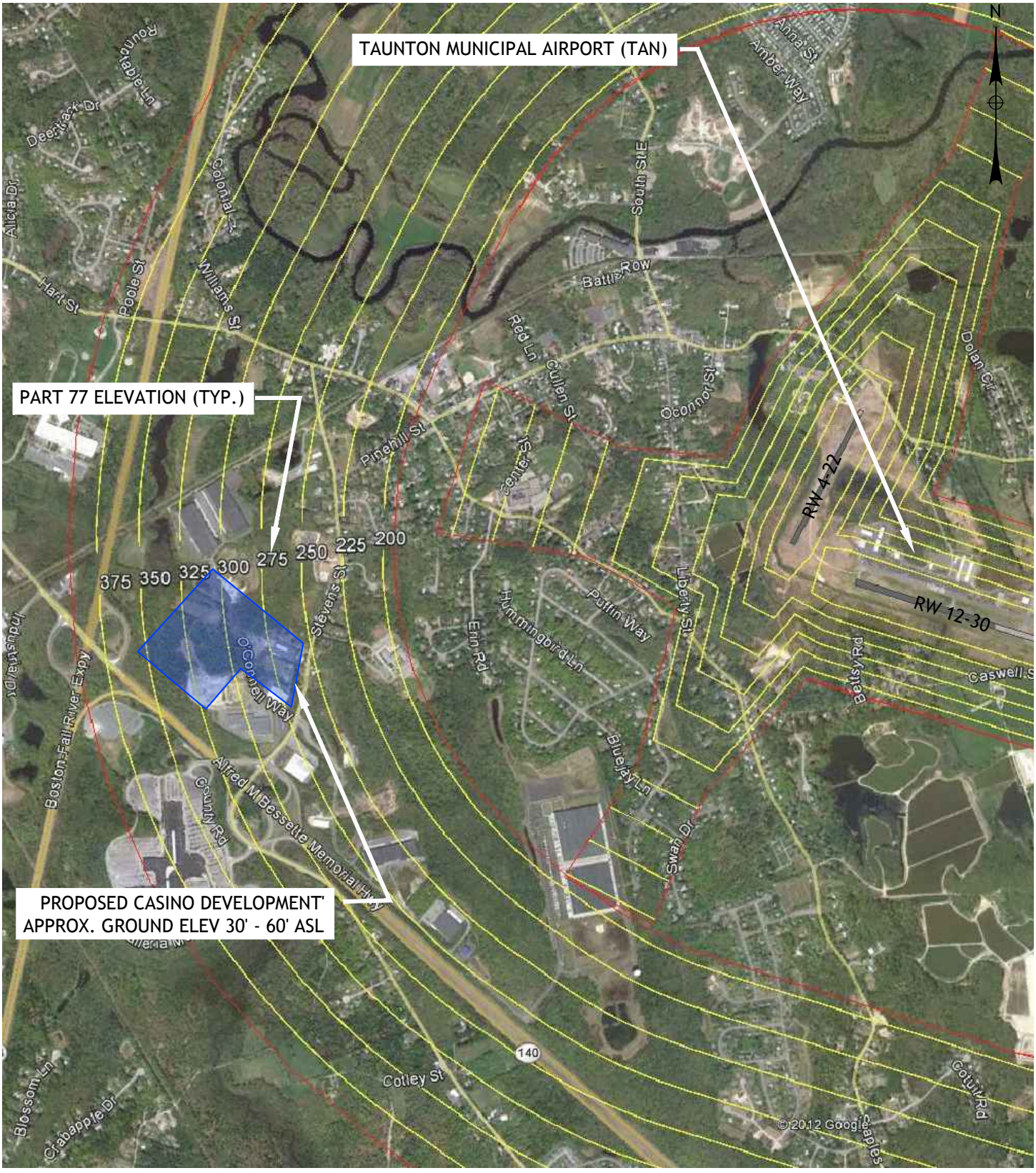
Description	Average Daily Flow		
	(Existing)	(Year 2025)	(Year 2035)
Existing Flow	7.1	7.1	7.1
Flow From Priority Needs Areas		0.18	0.968
Flow From other Sewer Extensions		0.04	0.08
Flow From Infill Sewers		0.1	0.2
Additional Flow Through IMAs		0.513	1.025
Flow From Planned Development [2]		0.315	0.415
Water Solutions Group [1]			
Industrial Allowance		0.1	0.2
Total	7.1	8.348	9.988
Projected Peak Flow	22.4	26.5	26.5

1. Flow from Water Solutions Group is presently at its maximum capacity of 0.2 mgd, which is included in the existing flow. The CWMP discussed an increase in the capacity from 0.1 mgd to 0.2 mgd and carried this increase in future flow projections.
2. Discussion of planned development is included in Section 2.2.2 and includes 0.225 mgd from the proposed casino.
3. Future industrial flow allowance includes 100,000 gallons per day from Miles Standish Industrial Park expansion Phases IV and V. Does not include a possible 0.3 mgd of reclaim water return from TMLP

GREENHOUSE GAS TECHNICAL APPENDIX

Appendix G-1	FAA Height Restrictions Map
Appendix G-2	PV Watts Viewer Siting Figure and Model Output Tables
Appendix G-3	Greenhouse Gas Calculations
Appendix G-4	VisualDOE Model Output

Appendix G-1
FAA Height Restrictions Map



PROJECT NO.	115-001
CADD FILE	TAN-PART77-CASINO-OE.dwg
DATE	MAY 15, 2012
DRAWING SCALE	NTS
DESIGNED BY	EPL
DRAWN BY	EPL

SHEET TITLE

PART 77 ANALYSIS FOR
PROPOSED CASINO

FIGURE NO.

1

AIRPORT SOLUTIONS GROUP
INNOVATIVE AIRPORT DEVELOPMENT SPECIALISTS
AIRPORT CONSULTANTS • WOBURN, MASSACHUSETTS
PHONE (781) 491-0083 FAX (781) 491-0360

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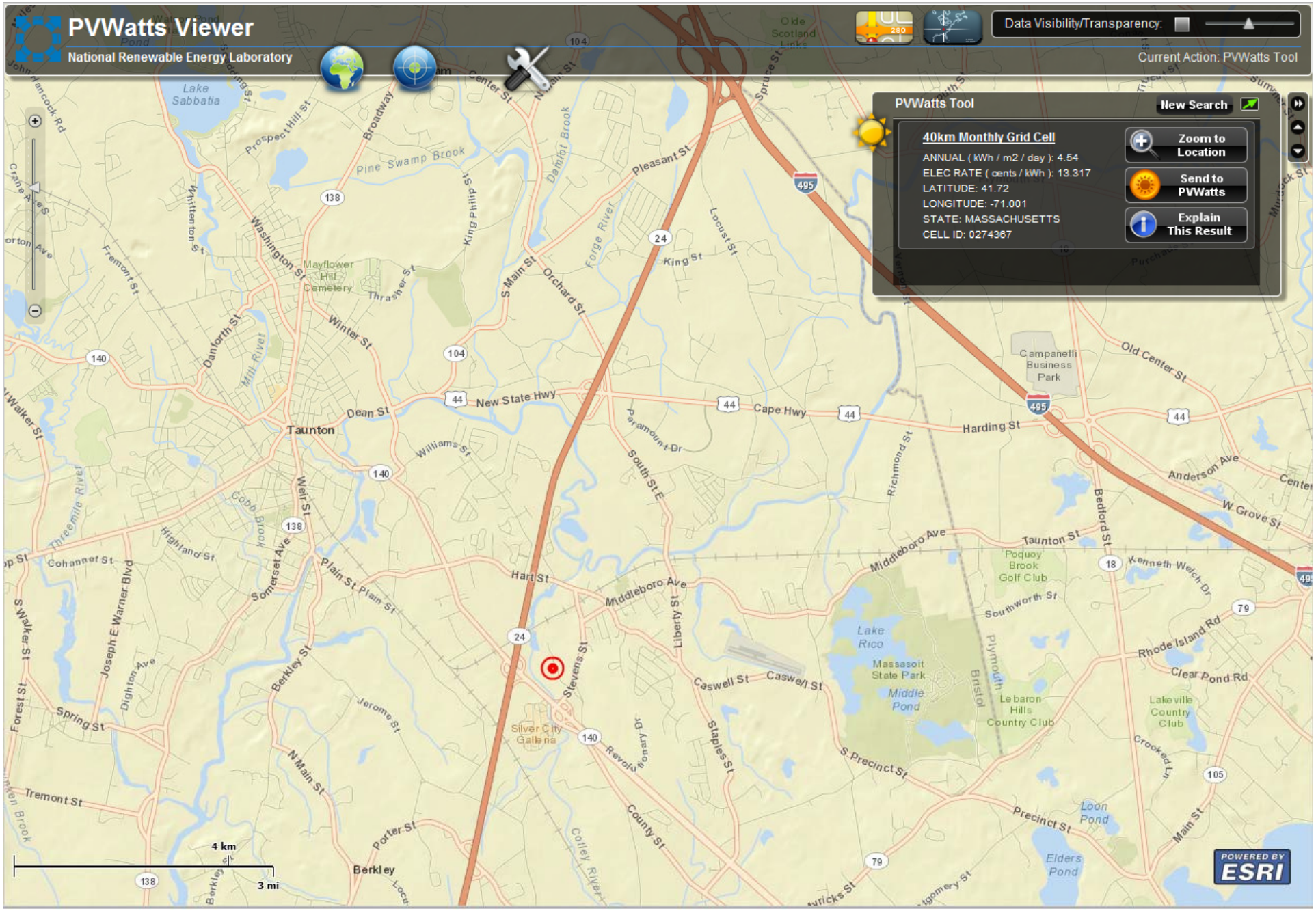
PROJECT

TAUNTON MUNICIPAL AIRPORT

DRAFT

Appendix G-2
PV Watts Viewer Siting Figure and Model Output Tables


PVWatts Viewer
National Renewable Energy Laboratory
Data Visibility/Transparency:
Current Action: PVWatts Tool
PVWatts Tool
New Search
40km Monthly Grid Cell
ANNUAL (kWh / m2 / day): 4.54
ELEC RATE (cents / kWh): 13.317
LATITUDE: 41.72
LONGITUDE: -71.001
STATE: MASSACHUSETTS
CELL ID: 0274367
Zoom to Location
Send to PVWatts
Explain This Result
Taunton
Berkley
Lake Sabbatia
Mayflower Hill Cemetery
Campanelli Business Park
Poquoy Brook Golf Club
Lake Rico
Massasoit State Park
Middle Pond
Lebaron Hills Country Club
Lakeville Country Club
Silver City Galleria
Loon Pond
Elders Pond
4 km
3 mi
POWERED BY ESRI

PVWatts * * * * *

AC Energy & Cost Savings

* * * * *

Cautions for Interpreting the Results

Taunton Site - Preferred Alternative

Station Identification

Cell ID:	0274367
State:	Massachusetts
Latitude:	41.7 ° N
Longitude:	71.0 ° W

PV System Specifications

DC Rating:	2850.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	2194.5 kW
Array Type:	Fixed Tilt
Array Tilt:	25.0 °
Array Azimuth:	150.0 °

Energy Specifications

Cost of Electricity:	14.5 ¢/kWh

Results

Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	2.71	188974	27401.23
2	3.55	224333	32528.28
3	4.70	320874	46526.73
4	5.07	327229	47448.21
5	5.67	364543	52858.74
6	5.95	358511	51984.10
7	5.66	345820	50143.90
8	5.56	340973	49441.08
9	4.78	288464	41827.28
10	4.00	260338	37749.01
11	2.70	173181	25111.24
12	2.39	160959	23339.06
Year	4.40	3354200	486359.00

Output Hourly Performance Data

(Gridded data is monthly, hourly output not available.)

Output Results as Text

Saving Text from a Browser

Run PVWATTS v.2 for another location

Run PVWATTS v.1

Please send questions and comments to Webmaster

Disclaimer and copyright notice.

RReDC home page (http://rredc.nrel.gov)

PVWatts * * * * *

AC Energy & Cost Savings

* * * * *

Cautions for Interpreting the Results

Taunton Site - Reduced Intensity Alternative 1

Station Identification

Cell ID:	0274367
State:	Massachusetts
Latitude:	41.7 ° N
Longitude:	71.0 ° W

PV System Specifications

DC Rating:	2549.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	1962.7 kW
Array Type:	Fixed Tilt
Array Tilt:	25.0 °
Array Azimuth:	150.0 °

Energy Specifications

Cost of Electricity:	14.5 ¢/kWh

Results

Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	2.71	169016	24507.32
2	3.55	200641	29092.94
3	4.70	286986	41612.97
4	5.07	292669	42437.00
5	5.67	326042	47276.09
6	5.95	320648	46493.96
7	5.66	309297	44848.07
8	5.56	304962	44219.49
9	4.78	257998	37409.71
10	4.00	232843	33762.24
11	2.70	154891	22459.19
12	2.39	143960	20874.20
Year	4.40	2999950	434992.75

Output Hourly Performance Data

(Gridded data is monthly, hourly output not available.)

Output Results as Text

Saving Text from a Browser

Run PVWATTS v.2 for another location

Run PVWATTS v.1

PVWatts * * * * *

AC Energy & Cost Savings

* * * * *

Cautions for Interpreting the Results

Taunton Site - Reduced Intensity Alternative 2

Station Identification

Cell ID:	0274367
State:	Massachusetts
Latitude:	41.7 ° N
Longitude:	71.0 ° W

PV System Specifications

DC Rating:	2340.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	1801.8 kW
Array Type:	Fixed Tilt
Array Tilt:	25.0 °
Array Azimuth:	150.0 °

Energy Specifications

Cost of Electricity:	14.5 ¢/kWh

Results

Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	2.71	155158	22497.91
2	3.55	184190	26707.55
3	4.70	263455	38200.97
4	5.07	268672	38957.44
5	5.67	299309	43399.81
6	5.95	294357	42681.76
7	5.66	283937	41170.86
8	5.56	279957	40593.76
9	4.78	236844	34342.38
10	4.00	213751	30993.90
11	2.70	142191	20617.69
12	2.39	132156	19162.62
Year	4.40	2753975	399326.38

Output Hourly Performance Data

(Gridded data is monthly, hourly output not available.)

Output Results as Text

Saving Text from a Browser

Run PVWATTS v.2 for another location

Run PVWATTS v.1

Appendix G-3
Greenhouse Gas Calculations

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project
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Estimates of Existing Conditions Direct GHG Emissions Generation on Project Site

Use	Program	Generation Rate	CO2 Emission Rate	CO2 Emissions
Commercial-Industrial-Warehouse	108,700 square feet	31.8 cubic feet of natural gas/square foot /year	0.1202 pound CO2/cubic feet natural gas	208 short tons/year
Office	40,400 square feet	31.8 cubic feet of natural gas/square foot /year	0.1202 pound CO2/cubic feet natural gas	77 short tons/year
Residential	3 residences	91.1 thousand cubic feet natural gas/residence/year	0.1202 pound CO2/cubic feet natural gas	16 short tons/year

Estimates of No Action Alternative Direct GHG Emissions Generation on Project Site

Use	Program	Generation Rate	CO2 Emission Rate	CO2 Emissions
Commercial-Industrial-Warehouse	663,400 square feet	31.8 cubic feet of natural gas/square foot /year	0.1202 pound CO2/cubic feet natural gas	1,267 short tons/year
Office	69,900 square feet	31.8 cubic feet of natural gas/square foot /year	0.1202 pound CO2/cubic feet natural gas	134 short tons/year
Residential	3 residences	91.1 thousand cubic feet natural gas/residence/year	0.1202 pound CO2/cubic feet natural gas	16 short tons/year

Data sources: US Energy Information Administration (EIA), Trends in U.S. Residential Natural Gas Consumption, June 2010, Table 1; http://www.epa.gov/climateleadership/documents/emission-factors.pdf, last modified November 7, 2011; 2003 EIA study of commercial buildings, per http://www.mge.com/Images/PDF/Brochures/Business/ManagingEnergyCostsInOfficeBuildings.pdf; http://www.epa.gov/climateleadership/documents/emission-factors.pdf, last modified November 7, 2011

Estimates of Proposed Development Direct GHG Emissions Generation on Project Site

Use	Generation Rate	CO2 Emission Rate	CO2 Emissions
Proposed Development - Baseline	1,773,591 therm/year	11.69 pounds/therm	10,367 short tons/year
Proposed Development - Mitigated	1,614,389 therm/year	11.69 pounds/therm	9,436 short tons/year
		Percent Improvement Over Baseline:	9%

Estimates of Reduced Intensity Alternative 1 Direct GHG Emissions Generation on Project Site

Use	Generation Rate	CO2 Emission Rate	CO2 Emissions
Reduced Alternative 1 - Baseline	1,234,316 therm/year	11.69 pounds/therm	7,215 short tons/year
Reduced Alternative 1 - Mitigated	939,482 therm/year	11.69 pounds/therm	5,491 short tons/year
		Percent Improvement Over Baseline:	24%

Estimates of Reduced Intensity Alternative 2 Direct GHG Emissions Generation on Project Site

Use	Generation Rate	CO2 Emission Rate	CO2 Emissions
Reduced Alternative 2 - Baseline	1,491,559 therm/year	11.69 pounds/therm	8,718 short tons/year
Reduced Alternative 2 - Mitigated	1,367,507 therm/year	11.69 pounds/therm	7,993 short tons/year
		Percent Improvement Over Baseline:	8%

Data sources: Attached VisualDOE modeling. Baseline is compliance with code ASHRAE 90.1 - 2007. Mitigated includes proposed mitigation measures as described in Section 8.12.2.3.
http://www.epa.gov/climateleadership/documents/emission-factors.pdf, last modified November 7, 2011

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Estimates of Existing Conditions Indirect GHG Emissions Generation on Project Site

Use	Program	Generation Rate	CO2 Emission Rate	CO2 Emissions
Commercial-Industrial-Warehouse	108,700 square feet	17.3 kWh/square foot /year	719 pounds/MWh	676 short tons/year
Office	40,400 square feet	17.3 kWh/square foot /year	719 pounds/MWh	251 short tons/year
Residential	3 residences	11,496 kWh/residence/year	719 pounds/MWh	12 short tons/year

Estimates of No Action Alternative Indirect GHG Emissions Generation on Project Site

Use	Program	Generation Rate	CO2 Emission Rate	CO2 Emissions
Commercial-Industrial-Warehouse	663,400 square feet	17.3 kWh/square foot /year	719 pounds/MWh	4,126 short tons/year
Office	69,900 square feet	17.3 kWh/square foot /year	719 pounds/MWh	435 short tons/year
Residential	3 residences	11,496 kWh/residence/year	719 pounds/MWh	12 short tons/year

Data sources: US Energy Information Administration (EIA), Trends in U.S. Residential Natural Gas Consumption, June 2010, Table 1; http://www.epa.gov/climateleadership/documents/emission-factors.pdf, last modified November 7, 2011; 2003 EIA study of commercial buildings, per http://www.mge.com/Images/PDF/Brochures/Business/ManagingEnergyCostsInOfficeBuildings.pdf
ISO-New England Final 2012 Emissions Report, Tables 1-1, 5-2 and App Table 3.

Estimates of Proposed Development Indirect GHG Emissions Generation on Project Site

Use	Generation Rate	CO2 Emission Rate	CO2 Emissions
Proposed Development - Baseline	45,926,810 kWh/year	719 pounds/MWh	16,511 short tons/year
Proposed Development - Mitigated	35,130,600 kWh/year	719 pounds/MWh	12,629 short tons/year
		Percent Improvement Over Baseline:	24%

Estimates of Reduced Intensity Alternative 1 Indirect GHG Emissions Generation on Project Site

Use	Generation Rate	CO2 Emission Rate	CO2 Emissions
Reduced Alternative 1 - Baseline	25,295,530 kWh/year	719 pounds/MWh	9,094 short tons/year
Reduced Alternative 1 - Mitigated	19,704,590 kWh/year	719 pounds/MWh	7,084 short tons/year
		Percent Improvement Over Baseline:	22%

Estimates of Reduced Intensity Alternative 2 Indirect GHG Emissions Generation on Project Site

Use	Generation Rate	CO2 Emission Rate	CO2 Emissions
Reduced Alternative 2 - Baseline	43,398,530 kWh/year	719 pounds/MWh	15,602 short tons/year
Reduced Alternative 2 - Mitigated	33,502,930 kWh/year	719 pounds/MWh	12,044 short tons/year
		Percent Improvement Over Baseline:	23%

Data sources: Attached VisualDOE modeling. Baseline is compliance with code ASHRAE 90.1 - 2007. Mitigated includes proposed mitigation measures as described in Section 8.12.2.3.
ISO-New England Final 2012 Emissions Report, Tables 1-1, 5-2 and App Table 3.

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project
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GHG Emission Rates

Fuel Type	CO2 Factor, pound per MMBtu	CH4 Factor, pound per MMBtu	N2O Factor, pound per MMBtu	CO2e Factor, pound per MMBtu
Bituminous Coal	0.206	2.43E-05	3.53E-06	0.208
Wood and Wood Residuals*	0.207	7.05E-05	9.26E-06	0.211
Propane Gas	0.135	4.85E-08	2.20E-07	0.135
Distillate Fuel Oil No, 2	0.165	6.61E-06	1.32E-06	0.166
Kerosene	0.166	6.61E-06	1.32E-06	0.167
Liquefied Petroleum Gases (LPG)	0.139	6.61E-06	1.32E-06	0.140
Residual Oil No. 6	0.166	6.61E-06	1.32E-06	0.167
Natural Gas	0.117	2.20E-06	2.20E-07	0.117

* direct emissions from combustion only; does not address lifecycle carbon emissions.

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project
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POTENTIAL FOR PV ENERGY PRODUCTION AND GHG OFFSET

Use	Available Area	Potential PV Panel Coverage	Peak Rated DC Panel Output	Peak Rated DC Project Output	Modeled Electric Output	Avoided CO2 Emission Rate	Avoided CO2 Emissions
Proposed Development	21.8 acres	25 %	12 W/square foot	2850 kW	3354 MWh/year	719 pounds/MWh	1,206 short tons/year
Reduced Intensity Alternative 1	19.5 acres	25 %	12 W/square foot	2549 kW	3000 MWh/year	719 pounds/MWh	1,078 short tons/year
Reduced Intensity Alternative 2	17.9 acres	25 %	12 W/square foot	2340 kW	2754 MWh/year	719 pounds/MWh	990 short tons/year

Data sources: Attached PVWatts model runs
ISO-New England Final 2012 Emissions Report, Tables 1-1, 5-2 and App Table 3.

Mashpee Wampanoag Tribe Fee-to-Trust and Casino Project
Final Environmental Impact Statement
Greenhouse Gas Calculations
4/4/2014

Totals, short tons CO2/year

With Mitigation	Direct	Indirect	Transportation	Total
Baseline	301	940	186	1,427
No-Action	1,417	4,573	228	6,219
Proposed Development	9,436	12,629	5,547	27,613
Reduced Intensity Alternative 1	5,491	7,084	3,989	16,564
Reduced Intensity Alternative 2	7,993	12,044	5,547	25,585

Unmitigated	Direct	Indirect	Transportation	Total
Proposed Development	10,367	16,511	5,876	32,754
Reduced Intensity Alternative 1	7,215	9,094	4,131	20,440
Reduced Intensity Alternative 2	8,718	15,602	5,876	30,196

Percent reduction over unmitigated case, Proposed Development:	19%
Percent reduction over unmitigated case, Reduced Intensity Alternative 1:	23%
Percent reduction over unmitigated case Reduced Intensity Alternative 2:	18%

Alternative A: Base Case

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Gross Area: 2,453,744 ft²
Conditioned Area: 1,287,503 ft²
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt A Base Case
Case Description: Full build-out Phase 1A 1B 2 3 4
Number of Blocks: 17

Block 1, Level 2: PH 1a

Block Information	
Shape	CUSTOMBLK
Zoning	Custom
Number of Zones	32
Number of Facades	8

Ceiling and Plenum Heights	
Floor to Floor Height	20 ft
Plenum Height	5 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	-311.4	-1845.0
Y	0	Pt. 2	-398.7	-1845.0
Z	14	Pt. 3	-499.2	-1745.2
		Pt. 4	-506.8	-1752.7
		Pt. 5	-561.5	-1752.7
		Pt. 6	-561.5	-1619.3
		Pt. 7	-561.5	-1532.6
		Pt. 8	-462.8	-1532.6
		Pt. 9	-462.8	-1573.1
		Pt. 10	-454.3	-1573.1
		Pt. 11	-442.4	-1573.1
		Pt. 12	-442.4	-1547.0
		Pt. 13	-442.4	-1532.0
		Pt. 14	-227.8	-1532.0
		Pt. 15	-171.3	-1532.0
		Pt. 16	-66.1	-1532.0
		Pt. 17	-18.1	-1532.0
		Pt. 18	-18.1	-1547.0
		Pt. 19	-18.1	-1575.3
		Pt. 20	2.2	-1575.3
		Pt. 21	2.2	-1532.5
		Pt. 22	163.8	-1532.5
		Pt. 23	163.8	-1587.4
		Pt. 24	163.8	-1650.4
		Pt. 25	149.4	-1661.8
		Pt. 26	125.9	-1640.6
		Pt. 27	105.9	-1661.8
		Pt. 28	95.1	-1653.3
		Pt. 29	79.7	-1674.8
		Pt. 30	119.5	-1699.5
		Pt. 31	112.2	-1714.4
		Pt. 32	107.4	-1723.3
		Pt. 33	119.3	-1727.8
		Pt. 34	110.3	-1775.0
		Pt. 35	99.7	-1775.0
		Pt. 36	102.1	-1801.6
		Pt. 37	94.4	-1802.3
		Pt. 38	96.4	-1810.1
		Pt. 39	68.2	-1816.0
		Pt. 40	28.5	-1824.7
		Pt. 41	11.3	-1828.5
		Pt. 42	11.3	-1836.6
		Pt. 43	-79.6	-1836.6
		Pt. 44	-98.7	-1855.8
		Pt. 45	-71.9	-1977.1
		Pt. 46	-67.4	-1997.8

Alternative A: Mitigated Case

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Gross Area: 2,453,744 ft²
Conditioned Area: 1,287,503 ft²
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt A Design Case
Case Description: Full build-out Phase 1A 1B 2 3 4
Number of Blocks: 17

Block 1, Level 2: PH 1a

Block Information	
Shape	CUSTOMBLK
Zoning	Custom
Number of Zones	32
Number of Facades	8

Ceiling and Plenum Heights	
Floor to Floor Height	20 ft
Plenum Height	5 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	-311.4	-1845.0
Y	0	Pt. 2	-398.7	-1845.0
Z	14	Pt. 3	-499.2	-1745.2
		Pt. 4	-506.8	-1752.7
		Pt. 5	-561.5	-1752.7
		Pt. 6	-561.5	-1619.3
		Pt. 7	-561.5	-1532.6
		Pt. 8	-462.8	-1532.6
		Pt. 9	-462.8	-1573.1
		Pt. 10	-454.3	-1573.1
		Pt. 11	-442.4	-1573.1
		Pt. 12	-442.4	-1547.0
		Pt. 13	-442.4	-1532.0
		Pt. 14	-227.8	-1532.0
		Pt. 15	-171.3	-1532.0
		Pt. 16	-66.1	-1532.0
		Pt. 17	-18.1	-1532.0
		Pt. 18	-18.1	-1547.0
		Pt. 19	-18.1	-1575.3
		Pt. 20	2.2	-1575.3
		Pt. 21	2.2	-1532.5
		Pt. 22	163.8	-1532.5
		Pt. 23	163.8	-1587.4
		Pt. 24	163.8	-1650.4
		Pt. 25	149.4	-1661.8
		Pt. 26	125.9	-1640.6
		Pt. 27	105.9	-1661.8
		Pt. 28	95.1	-1653.3
		Pt. 29	79.7	-1674.8
		Pt. 30	119.5	-1699.5
		Pt. 31	112.2	-1714.4
		Pt. 32	107.4	-1723.3
		Pt. 33	119.3	-1727.8
		Pt. 34	110.3	-1775.0
		Pt. 35	99.7	-1775.0
		Pt. 36	102.1	-1801.6
		Pt. 37	94.4	-1802.3
		Pt. 38	96.4	-1810.1
		Pt. 39	68.2	-1816.0
		Pt. 40	28.5	-1824.7
		Pt. 41	11.3	-1828.5
		Pt. 42	11.3	-1836.6
		Pt. 43	-79.6	-1836.6
		Pt. 44	-98.7	-1855.8
		Pt. 45	-71.9	-1977.1
		Pt. 46	-67.4	-1997.8

Alternative A: Base Case

Pt. 47	-127.3	-1997.8
Pt. 48	-127.3	-1955.0
Pt. 49	-135.3	-1911.5
Pt. 50	-153.7	-1877.7
Pt. 51	-197.9	-1850.5
Pt. 52	-221.1	-1845.0

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_221854 g	5	7.5	5
Surface_221856 g	5	7.5	5
Surface_221857 g	5	7.5	5
Surface_221896 g	5	7.5	5
Surface_221962 g	5	7.5	5
Surface_221964 g	5	7.5	5
Surface_222026 g	5	7.5	5
Surface_222072 g	5	7.5	5
Surface_222074 g	5	7.5	5
Surface_222076 g	5	7.5	5
Surface_222077 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22185 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22185 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22185 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22189 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22196 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22196 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22202 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_221709	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221817	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221818	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221819	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221822	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221823	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221824	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221841	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221842	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221843	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

Pt. 47	-127.3	-1997.8
Pt. 48	-127.3	-1955.0
Pt. 49	-135.3	-1911.5
Pt. 50	-153.7	-1877.7
Pt. 51	-197.9	-1850.5
Pt. 52	-221.1	-1845.0

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_221854 g	5	7.5	5
Surface_221856 g	5	7.5	5
Surface_221857 g	5	7.5	5
Surface_221896 g	5	7.5	5
Surface_221962 g	5	7.5	5
Surface_221964 g	5	7.5	5
Surface_222026 g	5	7.5	5
Surface_222072 g	5	7.5	5
Surface_222074 g	5	7.5	5
Surface_222076 g	5	7.5	5
Surface_222077 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22185 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22185 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22185 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22189 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22196 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22196 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22202 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_221709	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221817	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221818	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221819	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221822	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221823	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221824	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221841	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221842	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221843	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

Surface_221844	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221845	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221853	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221854	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221856	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221857	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221892	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221896	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221898	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221899	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221900	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221901	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221915	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222056	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221952	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221953	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221954	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221962	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221963	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221964	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221965	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221966	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221967	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221969	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221970	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222011	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222012	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222025	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222026	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_222050	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222051	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222052	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222053	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222054	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222055	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222068	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222070	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222072	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_222074	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_222075	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222076	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_222077	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							

Alternative A: Mitigated Case

Surface_221844	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221845	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221853	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221854	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221856	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221857	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221892	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221896	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221898	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221899	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221900	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221901	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221915	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222056	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221952	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221953	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221954	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221962	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221963	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221964	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221965	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221966	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221967	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221969	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221970	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222011	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222012	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222025	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222026	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_222050	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222051	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222052	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222053	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222054	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222055	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222068	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222070	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222072	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_222074	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_222075	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222076	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_222077	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							

Alternative A: Base Case

Block 2, Level 2: PH 1b

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	19	Number of Floors	1
Number of Facades	10		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	331.4	-2055.3
Y	0	Pt. 2	342.9	-2055.3
Z	14	Pt. 3	356.5	-2055.3
		Pt. 4	379.7	-2071.3
		Pt. 5	399.7	-2094.2
		Pt. 6	422.9	-2139.5
		Pt. 7	342.9	-2139.5
		Pt. 8	342.9	-2180.0
		Pt. 9	342.9	-2196.3
		Pt. 10	129.7	-2196.3
		Pt. 11	129.7	-2256.6
		Pt. 12	67.1	-2256.6
		Pt. 13	9.7	-2256.6
		Pt. 14	-6.6	-2256.6
		Pt. 15	-127.3	-2133.6
		Pt. 16	-127.3	-2052.9
		Pt. 17	-127.3	-1997.8
		Pt. 18	-112.3	-1997.8
		Pt. 19	-67.4	-1997.8
		Pt. 20	-71.9	-1977.1
		Pt. 21	-98.7	-1855.8
		Pt. 22	-79.6	-1836.6
		Pt. 23	11.3	-1836.6
		Pt. 24	11.3	-1828.5
		Pt. 25	28.5	-1824.7
		Pt. 26	45.2	-1872.1
		Pt. 27	54.8	-1865.0
		Pt. 28	73.5	-1898.8
		Pt. 29	81.4	-1909.6
		Pt. 30	109.9	-1939.8
		Pt. 31	143.3	-1963.5
		Pt. 32	168.6	-1975.7
		Pt. 33	213.8	-1987.6
		Pt. 34	238.7	-1990.8
		Pt. 35	268.2	-1990.9
		Pt. 36	292.6	-1987.8
		Pt. 37	296.3	-2011.4
		Pt. 38	331.4	-2029.7

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_222271	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_222271	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative A: Mitigated Case

Block 2, Level 2: PH 1b

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	19	Number of Floors	1
Number of Facades	10		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	331.4	-2055.3
Y	0	Pt. 2	342.9	-2055.3
Z	14	Pt. 3	356.5	-2055.3
		Pt. 4	379.7	-2071.3
		Pt. 5	399.7	-2094.2
		Pt. 6	422.9	-2139.5
		Pt. 7	342.9	-2139.5
		Pt. 8	342.9	-2180.0
		Pt. 9	342.9	-2196.3
		Pt. 10	129.7	-2196.3
		Pt. 11	129.7	-2256.6
		Pt. 12	67.1	-2256.6
		Pt. 13	9.7	-2256.6
		Pt. 14	-6.6	-2256.6
		Pt. 15	-127.3	-2133.6
		Pt. 16	-127.3	-2052.9
		Pt. 17	-127.3	-1997.8
		Pt. 18	-112.3	-1997.8
		Pt. 19	-67.4	-1997.8
		Pt. 20	-71.9	-1977.1
		Pt. 21	-98.7	-1855.8
		Pt. 22	-79.6	-1836.6
		Pt. 23	11.3	-1836.6
		Pt. 24	11.3	-1828.5
		Pt. 25	28.5	-1824.7
		Pt. 26	45.2	-1872.1
		Pt. 27	54.8	-1865.0
		Pt. 28	73.5	-1898.8
		Pt. 29	81.4	-1909.6
		Pt. 30	109.9	-1939.8
		Pt. 31	143.3	-1963.5
		Pt. 32	168.6	-1975.7
		Pt. 33	213.8	-1987.6
		Pt. 34	238.7	-1990.8
		Pt. 35	268.2	-1990.9
		Pt. 36	292.6	-1987.8
		Pt. 37	296.3	-2011.4
		Pt. 38	331.4	-2029.7

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_222271	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_222271	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative A: Base Case

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Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_222197	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222212	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222213	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222214	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222215	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222217	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222218	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222219	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222220	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222221	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222222	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222223	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222244	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222246	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222247	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222248	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222249	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222250	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222251	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222252	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222253	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222254	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222255	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222256	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222257	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222258	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222259	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222260	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222261	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222262	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222263	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222264	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222265	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222266	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222267	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222269	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222271	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_222272	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

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Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_222197	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222212	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222213	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222214	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222215	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222217	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222218	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222219	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222220	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222221	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222222	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222223	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222244	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222246	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222247	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222248	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222249	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222250	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222251	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222252	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222253	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222254	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222255	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222256	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222257	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222258	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222259	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222260	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222261	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222262	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222263	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222264	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222265	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222266	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222267	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222269	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222271	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_222272	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

Block 3, Level 2: PH 2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	6	Number of Floors	1
Number of Facades	6		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	102.1	-1801.6
Y	0	Pt. 2	119.2	-1799.7
Z	14	Pt. 3	129.4	-1831.8
		Pt. 4	141.4	-1853.0
		Pt. 5	164.8	-1878.9
		Pt. 6	184.0	-1892.8
		Pt. 7	202.9	-1904.1
		Pt. 8	227.9	-1909.3
		Pt. 9	239.2	-1910.7
		Pt. 10	237.8	-1933.0
		Pt. 11	251.5	-1933.9
		Pt. 12	251.6	-1929.0
		Pt. 13	278.7	-1927.0
		Pt. 14	279.3	-1930.4
		Pt. 15	282.9	-1929.8
		Pt. 16	286.2	-1960.4
		Pt. 17	292.6	-1987.8
		Pt. 18	268.2	-1990.9
		Pt. 19	238.7	-1990.8
		Pt. 20	213.8	-1987.6
		Pt. 21	168.6	-1975.7
		Pt. 22	143.3	-1963.5
		Pt. 23	109.9	-1939.8
		Pt. 24	81.4	-1909.6
		Pt. 25	73.5	-1898.8
		Pt. 26	54.8	-1865.0
		Pt. 27	45.2	-1872.1
		Pt. 28	28.5	-1824.7
		Pt. 29	68.2	-1816.0
		Pt. 30	96.4	-1810.1
		Pt. 31	94.4	-1802.3

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_224303 g	5	7.5	5
Surface_224304 g	5	7.5	5
Surface_224305 g	5	7.5	5
Surface_224306 g	5	7.5	5
Surface_224341 g	5	7.5	5
Surface_224342 g	5	7.5	5
Surface_224345 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_224303 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224304 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative A: Mitigated Case

Block 3, Level 2: PH 2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	6	Number of Floors	1
Number of Facades	6		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	102.1	-1801.6
Y	0	Pt. 2	119.2	-1799.7
Z	14	Pt. 3	129.4	-1831.8
		Pt. 4	141.4	-1853.0
		Pt. 5	164.8	-1878.9
		Pt. 6	184.0	-1892.8
		Pt. 7	202.9	-1904.1
		Pt. 8	227.9	-1909.3
		Pt. 9	239.2	-1910.7
		Pt. 10	237.8	-1933.0
		Pt. 11	251.5	-1933.9
		Pt. 12	251.6	-1929.0
		Pt. 13	278.7	-1927.0
		Pt. 14	279.3	-1930.4
		Pt. 15	282.9	-1929.8
		Pt. 16	286.2	-1960.4
		Pt. 17	292.6	-1987.8
		Pt. 18	268.2	-1990.9
		Pt. 19	238.7	-1990.8
		Pt. 20	213.8	-1987.6
		Pt. 21	168.6	-1975.7
		Pt. 22	143.3	-1963.5
		Pt. 23	109.9	-1939.8
		Pt. 24	81.4	-1909.6
		Pt. 25	73.5	-1898.8
		Pt. 26	54.8	-1865.0
		Pt. 27	45.2	-1872.1
		Pt. 28	28.5	-1824.7
		Pt. 29	68.2	-1816.0
		Pt. 30	96.4	-1810.1
		Pt. 31	94.4	-1802.3

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_224303 g	5	7.5	5
Surface_224304 g	5	7.5	5
Surface_224305 g	5	7.5	5
Surface_224306 g	5	7.5	5
Surface_224341 g	5	7.5	5
Surface_224342 g	5	7.5	5
Surface_224345 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_224303 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224304 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative A: Base Case

Surface_22430 5 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22430 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22434 1 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22434 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22434 5 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_224302	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224303 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224304 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224305 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224306 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224313	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224314	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224332	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224333	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224340	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224341 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224342 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224345 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224346	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224347	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224348	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224349	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224350	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224354	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224355	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224356	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224357	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224358	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224359	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224360	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224361	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224362	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224363	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224364	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224365	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224366	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

Surface_22430 5 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22430 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22434 1 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22434 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22434 5 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_224302	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224303 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224304 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224305 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224306 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224313	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224314	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224332	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224333	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224340	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224341 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224342 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224345 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224346	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224347	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224348	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224349	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224350	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224354	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224355	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224356	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224357	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224358	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224359	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224360	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224361	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224362	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224363	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224364	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224365	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224366	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

Block 4, Level 2: PH 3

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	10	Number of Floors	1
Number of Facades	4		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	282.9	-1929.8
Y	0	Pt. 2	279.3	-1930.4
Z	52	Pt. 3	278.7	-1927.0
		Pt. 4	282.0	-1905.3
		Pt. 5	309.7	-1904.6
		Pt. 6	361.2	-1911.1
		Pt. 7	420.0	-1931.9
		Pt. 8	415.5	-1941.0
		Pt. 9	443.9	-1957.2
		Pt. 10	519.1	-2082.1
		Pt. 11	526.7	-2113.7
		Pt. 12	566.7	-2113.7
		Pt. 13	566.7	-2262.5
		Pt. 14	342.9	-2262.5
		Pt. 15	342.9	-2196.3
		Pt. 16	342.9	-2139.5
		Pt. 17	422.9	-2139.5
		Pt. 18	399.7	-2094.2
		Pt. 19	379.7	-2071.3
		Pt. 20	356.5	-2055.3
		Pt. 21	342.9	-2055.3
		Pt. 22	331.4	-2055.3
		Pt. 23	331.4	-2029.7
		Pt. 24	296.3	-2011.4
		Pt. 25	292.6	-1987.8
		Pt. 26	286.2	-1960.4

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_224370 g	5	7.5	5
Surface_224371 g	5	7.5	5
Surface_224372 g	5	7.5	5
Surface_224373 g	5	7.5	5
Surface_224374 g	5	7.5	5
Surface_224433	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_224370 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224371 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224372 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224373 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224374 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative A: Mitigated Case

Block 4, Level 2: PH 3

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	10	Number of Floors	1
Number of Facades	4		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	282.9	-1929.8
Y	0	Pt. 2	279.3	-1930.4
Z	52	Pt. 3	278.7	-1927.0
		Pt. 4	282.0	-1905.3
		Pt. 5	309.7	-1904.6
		Pt. 6	361.2	-1911.1
		Pt. 7	420.0	-1931.9
		Pt. 8	415.5	-1941.0
		Pt. 9	443.9	-1957.2
		Pt. 10	519.1	-2082.1
		Pt. 11	526.7	-2113.7
		Pt. 12	566.7	-2113.7
		Pt. 13	566.7	-2262.5
		Pt. 14	342.9	-2262.5
		Pt. 15	342.9	-2196.3
		Pt. 16	342.9	-2139.5
		Pt. 17	422.9	-2139.5
		Pt. 18	399.7	-2094.2
		Pt. 19	379.7	-2071.3
		Pt. 20	356.5	-2055.3
		Pt. 21	342.9	-2055.3
		Pt. 22	331.4	-2055.3
		Pt. 23	331.4	-2029.7
		Pt. 24	296.3	-2011.4
		Pt. 25	292.6	-1987.8
		Pt. 26	286.2	-1960.4

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_224370 g	5	7.5	5
Surface_224371 g	5	7.5	5
Surface_224372 g	5	7.5	5
Surface_224373 g	5	7.5	5
Surface_224374 g	5	7.5	5
Surface_224433	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_224370 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224371 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224372 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224373 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224374 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative A: Base Case

Surface_224433	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_224367	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224368	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224369	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224370	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224371	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224372	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224373	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224374	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224398	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224399	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224400	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224401	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224402	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224403	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224405	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224406	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224407	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224408	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224424	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224425	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224430	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224431	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224432	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224433	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224438	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224442	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

Surface_224433	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_224367	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224368	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224369	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224370	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224371	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224372	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224373	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224374	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224398	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224399	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224400	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224401	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224402	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224403	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224405	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224406	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224407	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224408	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224424	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224425	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224430	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224431	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224432	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224433	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224438	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224442	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

Block 5, Level 4: PH 3 N tower

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	10	Number of Floors	12
Number of Facades	4		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	-418	Pt. 1	223.4	-2019.1
Y	-1845	Pt. 2	32.3	-1873.9
Z	85	Pt. 3	71.6	-1822.1
		Pt. 4	262.7	-1967.3

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_1400	6	4.5	5.5
Surface_1402	6	4.5	5.5
Surface_1404	6	4.5	5.5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_1400	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_1402	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_1404	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_1400	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_1402	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_1404	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_1405	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

Block 5, Level 4: PH 3 N tower

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	10	Number of Floors	12
Number of Facades	4		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	-418	Pt. 1	223.4	-2019.1
Y	-1845	Pt. 2	32.3	-1873.9
Z	54	Pt. 3	71.6	-1822.1
		Pt. 4	262.7	-1967.3

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_1400	6	4.5	5.5
Surface_1402	6	4.5	5.5
Surface_1404	6	4.5	5.5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_1400	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_1402	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_1404	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_1400	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_1402	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_1404	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_1405	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

Block 6, Level 4: PH 3 S tower

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	10	Number of Floors	12
Number of Facades	4		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	-418	Pt. 1	414.5	-2164.3
Y	-1845	Pt. 2	223.4	-2019.1
Z	85	Pt. 3	262.7	-1967.3
		Pt. 4	453.8	-2112.5

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_1411	6	4.5	5.5
Surface_1415	6	4.5	5.5
Surface_1416	6	4.5	5.5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_1411	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_1415	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_1416	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_1411	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_1415	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_1416	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_1417	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

Block 6, Level 4: PH 3 S tower

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	10	Number of Floors	12
Number of Facades	4		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	-418	Pt. 1	414.5	-2164.3
Y	-1845	Pt. 2	223.4	-2019.1
Z	85	Pt. 3	262.7	-1967.3
		Pt. 4	453.8	-2112.5

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_1411	6	4.5	5.5
Surface_1415	6	4.5	5.5
Surface_1416	6	4.5	5.5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_1411	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_1415	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_1416	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_1411	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_1415	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_1416	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_1417	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

Block 7, Level 1: Garage 1

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	1 ft
Number of Zones	1	Number of Floors	4
Number of Facades	12		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	1139.3	-1753.0
Y	0	Pt. 2	1139.3	-2106.0
Z	0	Pt. 3	786.3	-2106.0
		Pt. 4	786.3	-1753.0

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228915	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228916	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228917	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228918	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

Block 7, Level 1: Garage 1

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	1 ft
Number of Zones	1	Number of Floors	4
Number of Facades	12		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	1139.3	-1753.0
Y	0	Pt. 2	1139.3	-2106.0
Z	0	Pt. 3	786.3	-2106.0
		Pt. 4	786.3	-1753.0

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	garage rf	0.250	10.6
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228915	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228916	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228917	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228918	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

Block 8, Level 1: Garage 2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	1 ft
Number of Zones	1	Number of Floors	3
Number of Facades	7		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	786.3	-1253.8
Y	0	Pt. 2	1181.3	-1253.8
Z	0	Pt. 3	1181.3	-1648.8
		Pt. 4	786.3	-1648.8

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228919	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228920	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228921	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228922	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

Block 8, Level 1: Garage 2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	1 ft
Number of Zones	1	Number of Floors	3
Number of Facades	7		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	786.3	-1253.8
Y	0	Pt. 2	1181.3	-1253.8
Z	0	Pt. 3	1181.3	-1648.8
		Pt. 4	786.3	-1648.8

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	garage rf	0.250	10.6
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228919	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228920	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228921	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228922	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

Block 9, Level 1: PH 4 Wtr Prk htl

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	10	Number of Floors	12
Number of Facades	4		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	641.4	-174.1
Y	0	Pt. 2	450.3	-28.9
Z	0	Pt. 3	489.6	22.9
		Pt. 4	680.7	-122.3

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surf_36878	6	4.5	5.5
Surf_36887	6	4.5	5.5
Surf_36892	6	4.5	5.5
Surf_36899	6	4.5	5.5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surf_36878	0	No	No	n.a.	n.a.	n.a.	n.a.
Surf_36887	0	No	No	n.a.	n.a.	n.a.	n.a.
Surf_36892	0	No	No	n.a.	n.a.	n.a.	n.a.
Surf_36899	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_36878	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surf_36887	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surf_36892	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surf_36899	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

Block 9, Level 1: PH 4 Wtr Prk htl

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	10	Number of Floors	12
Number of Facades	4		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	641.4	-174.1
Y	0	Pt. 2	450.3	-28.9
Z	0	Pt. 3	489.6	22.9
		Pt. 4	680.7	-122.3

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surf_36878	6	4.5	5.5
Surf_36887	6	4.5	5.5
Surf_36892	6	4.5	5.5
Surf_36899	6	4.5	5.5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surf_36878	0	No	No	n.a.	n.a.	n.a.	n.a.
Surf_36887	0	No	No	n.a.	n.a.	n.a.	n.a.
Surf_36892	0	No	No	n.a.	n.a.	n.a.	n.a.
Surf_36899	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_36878	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surf_36887	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surf_36892	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surf_36899	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2

Alternative A: Base Case

Block 10, Level 1: PH 4 Wtr Prk

Block Information	
Shape	Rect
Zoning	Perimeter Interior
Zone Depth	15 ft
Number of Zones	6
Number of Facades	4

Ceiling and Plenum Heights	
Floor to Floor Height	13 ft
Plenum Height	4 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Widths (ft)		Depths (ft)	
X	0	Width	160	Depth	160
Y	0				
Z	0				

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_146672	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_146676	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_146680	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_146683	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

Block 10, Level 1: PH 4 Wtr Prk

Block Information	
Shape	Rect
Zoning	Perimeter Interior
Zone Depth	15 ft
Number of Zones	6
Number of Facades	4

Ceiling and Plenum Heights	
Floor to Floor Height	13 ft
Plenum Height	4 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Widths (ft)		Depths (ft)	
X	0	Width	160	Depth	160
Y	0				
Z	0				

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_146672	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surf_146676	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surf_146680	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surf_146683	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

Block 11, Level 1: PH 1a Lower Level

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	14 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	14	Number of Floors	1
Number of Facades	55		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	192.9	-2059.8
Y	0	Pt. 2	301.9	-2059.8
Z	0	Pt. 3	301.9	-2068.0
		Pt. 4	321.2	-2068.0
		Pt. 5	321.3	-2244.8
		Pt. 6	302.0	-2244.8
		Pt. 7	302.0	-2256.1
		Pt. 8	220.9	-2256.1
		Pt. 9	220.9	-2181.3
		Pt. 10	211.9	-2181.3
		Pt. 11	211.9	-2166.3
		Pt. 12	192.9	-2166.3
		Pt. 13	192.9	-2135.0
		Pt. 14	132.2	-2135.0
		Pt. 15	132.2	-2257.5
		Pt. 16	-7.0	-2257.5
		Pt. 17	-127.3	-2126.8
		Pt. 18	-127.3	-1955.0
		Pt. 19	-142.8	-1897.5
		Pt. 20	-170.3	-1874.3
		Pt. 21	-200.3	-1855.4
		Pt. 22	-230.3	-1847.5
		Pt. 23	-270.0	-1847.5
		Pt. 24	-417.0	-1847.5
		Pt. 25	-433.8	-1830.7
		Pt. 26	-562.8	-1701.8
		Pt. 27	-562.8	-1653.1
		Pt. 28	-562.8	-1589.5
		Pt. 29	-562.8	-1532.0
		Pt. 30	-527.9	-1532.0
		Pt. 31	-440.3	-1532.0
		Pt. 32	-364.8	-1532.0
		Pt. 33	-171.5	-1532.0
		Pt. 34	-17.8	-1532.0
		Pt. 35	-17.8	-1566.1
		Pt. 36	3.2	-1566.1
		Pt. 37	3.2	-1532.0
		Pt. 38	162.4	-1532.0
		Pt. 39	162.4	-1659.4
		Pt. 40	129.7	-1695.1
		Pt. 41	109.8	-1741.8
		Pt. 42	106.7	-1786.8
		Pt. 43	106.7	-1805.7
		Pt. 44	12.9	-1805.7
		Pt. 45	12.9	-1854.2
		Pt. 46	37.8	-1854.2
		Pt. 47	42.1	-1865.0
		Pt. 48	57.7	-1895.3
		Pt. 49	79.4	-1925.0
		Pt. 50	99.7	-1945.9
		Pt. 51	110.7	-1955.2
		Pt. 52	129.7	-1968.7
		Pt. 53	159.7	-1985.0
		Pt. 54	192.9	-1996.7
		Pt. 55	192.9	-2013.0

Block Constructions

Alternative A: Mitigated Case

Block 11, Level 1: PH 1a Lower Level

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	14 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	14	Number of Floors	1
Number of Facades	55		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	192.9	-2059.8
Y	0	Pt. 2	301.9	-2059.8
Z	0	Pt. 3	301.9	-2068.0
		Pt. 4	321.2	-2068.0
		Pt. 5	321.3	-2244.8
		Pt. 6	302.0	-2244.8
		Pt. 7	302.0	-2256.1
		Pt. 8	220.9	-2256.1
		Pt. 9	220.9	-2181.3
		Pt. 10	211.9	-2181.3
		Pt. 11	211.9	-2166.3
		Pt. 12	192.9	-2166.3
		Pt. 13	192.9	-2135.0
		Pt. 14	132.2	-2135.0
		Pt. 15	132.2	-2257.5
		Pt. 16	-7.0	-2257.5
		Pt. 17	-127.3	-2126.8
		Pt. 18	-127.3	-1955.0
		Pt. 19	-142.8	-1897.5
		Pt. 20	-170.3	-1874.3
		Pt. 21	-200.3	-1855.4
		Pt. 22	-230.3	-1847.5
		Pt. 23	-270.0	-1847.5
		Pt. 24	-417.0	-1847.5
		Pt. 25	-433.8	-1830.7
		Pt. 26	-562.8	-1701.8
		Pt. 27	-562.8	-1653.1
		Pt. 28	-562.8	-1589.5
		Pt. 29	-562.8	-1532.0
		Pt. 30	-527.9	-1532.0
		Pt. 31	-440.3	-1532.0
		Pt. 32	-364.8	-1532.0
		Pt. 33	-171.5	-1532.0
		Pt. 34	-17.8	-1532.0
		Pt. 35	-17.8	-1566.1
		Pt. 36	3.2	-1566.1
		Pt. 37	3.2	-1532.0
		Pt. 38	162.4	-1532.0
		Pt. 39	162.4	-1659.4
		Pt. 40	129.7	-1695.1
		Pt. 41	109.8	-1741.8
		Pt. 42	106.7	-1786.8
		Pt. 43	106.7	-1805.7
		Pt. 44	12.9	-1805.7
		Pt. 45	12.9	-1854.2
		Pt. 46	37.8	-1854.2
		Pt. 47	42.1	-1865.0
		Pt. 48	57.7	-1895.3
		Pt. 49	79.4	-1925.0
		Pt. 50	99.7	-1945.9
		Pt. 51	110.7	-1955.2
		Pt. 52	129.7	-1968.7
		Pt. 53	159.7	-1985.0
		Pt. 54	192.9	-1996.7
		Pt. 55	192.9	-2013.0

Block Constructions

Alternative A: Base Case

VisualDOE 4.1 - Architectural Details **April 3, 2014**

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_227366 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22736 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_227230	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227231	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227232	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227233	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227234	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227235	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227236	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227237	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227238	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227239	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227240	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227241	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227267	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227268	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227269	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227276	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227278	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227279	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227280	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227281	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227282	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227283	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227307	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227286	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227287	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227288	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227289	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227290	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227291	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227292	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227293	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227294	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227295	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227300	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227301	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227302	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227303	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227304	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227305	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227306	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227309	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227344	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227352	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227353	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227354	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227356	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227361	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227364	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

VisualDOE 4.1 - Architectural Details **April 3, 2014**

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_227366 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22736 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_227230	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227231	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227232	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227233	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227234	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227235	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227236	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227237	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227238	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227239	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227240	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227241	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227267	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227268	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227269	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227276	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227278	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227279	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227280	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227281	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227282	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227283	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227307	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227286	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227287	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227288	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227289	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227290	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227291	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227292	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227293	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227294	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227295	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227300	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227301	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227302	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227303	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227304	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227305	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227306	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227309	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227344	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227352	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227353	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227354	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227356	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227361	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227364	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

Surface_227366	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_227367	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227369	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227370	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227371	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227372	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227373	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

Surface_227366	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_227367	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227369	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227370	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227371	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227372	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227373	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

Block 12, Level 3: PH 1a lvl2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	12	Number of Floors	1
Number of Facades	28		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	9.7	-1686.1
Y	0	Pt. 2	9.7	-1715.0
Z	34	Pt. 3	-50.3	-1715.0
		Pt. 4	-50.3	-1572.7
		Pt. 5	9.7	-1572.7
		Pt. 6	9.7	-1565.0
		Pt. 7	-2.3	-1565.0
		Pt. 8	-2.3	-1533.0
		Pt. 9	163.8	-1533.0
		Pt. 10	163.8	-1654.4
		Pt. 11	205.1	-1632.7
		Pt. 12	258.9	-1624.8
		Pt. 13	421.1	-1367.6
		Pt. 14	440.4	-1378.1
		Pt. 15	281.3	-1634.1
		Pt. 16	276.9	-1651.8
		Pt. 17	206.3	-1658.9
		Pt. 18	152.8	-1700.1
		Pt. 19	127.8	-1765.8
		Pt. 20	135.0	-1819.2
		Pt. 21	77.5	-1840.2
		Pt. 22	71.0	-1822.4
		Pt. 23	97.0	-1815.8
		Pt. 24	92.1	-1775.0
		Pt. 25	99.7	-1726.7
		Pt. 26	115.7	-1714.4
		Pt. 27	88.8	-1703.3
		Pt. 28	88.8	-1685.9

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_228961 g	5	7.5	5
Surface_228981 g	10	7.5	5
Surface_228992	10	7.5	5
Surface_229002 g	5	7.5	5
Surface_229004 g	5	7.5	5
Surface_229005 g	5	7.5	5
Surface_229006 g	5	7.5	5
Surface_229007 g	5	7.5	5
Surface_229009 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22896 1 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22898 1 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative A: Mitigated Case

Block 12, Level 3: PH 1a lvl2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	12	Number of Floors	1
Number of Facades	28		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	9.7	-1686.1
Y	0	Pt. 2	9.7	-1715.0
Z	34	Pt. 3	-50.3	-1715.0
		Pt. 4	-50.3	-1572.7
		Pt. 5	9.7	-1572.7
		Pt. 6	9.7	-1565.0
		Pt. 7	-2.3	-1565.0
		Pt. 8	-2.3	-1533.0
		Pt. 9	163.8	-1533.0
		Pt. 10	163.8	-1654.4
		Pt. 11	205.1	-1632.7
		Pt. 12	258.9	-1624.8
		Pt. 13	421.1	-1367.6
		Pt. 14	440.4	-1378.1
		Pt. 15	281.3	-1634.1
		Pt. 16	276.9	-1651.8
		Pt. 17	206.3	-1658.9
		Pt. 18	152.8	-1700.1
		Pt. 19	127.8	-1765.8
		Pt. 20	135.0	-1819.2
		Pt. 21	77.5	-1840.2
		Pt. 22	71.0	-1822.4
		Pt. 23	97.0	-1815.8
		Pt. 24	92.1	-1775.0
		Pt. 25	99.7	-1726.7
		Pt. 26	115.7	-1714.4
		Pt. 27	88.8	-1703.3
		Pt. 28	88.8	-1685.9

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_228961 g	5	7.5	5
Surface_228981 g	10	7.5	5
Surface_228992	10	7.5	5
Surface_229002 g	5	7.5	5
Surface_229004 g	5	7.5	5
Surface_229005 g	5	7.5	5
Surface_229006 g	5	7.5	5
Surface_229007 g	5	7.5	5
Surface_229009 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22896 1 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22898 1 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative A: Base Case

Surface_22899 2	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 5 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 9 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228923	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228989	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228958	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228961 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_228979	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228980	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228981 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_228992	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_228995	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228996	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228997	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228998	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228999	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229000	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229001	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229002 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229003	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229004 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229005 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229006 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229007 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229008 g	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229009 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229010	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229011	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229012	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229013	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229017	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

Surface_22899 2	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 5 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 9 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228923	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228989	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228958	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228961 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_228979	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228980	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228981 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_228992	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_228995	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228996	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228997	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228998	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228999	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229000	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229001	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229002 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229003	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229004 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229005 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229006 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229007 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229008 g	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229009 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229010	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229011	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229012	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229013	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229017	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

Block 13, Level 3: PH 1a lvl2 restaurant

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	5	Number of Floors	1
Number of Facades	6		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	-230.3	-1636.0
Y	0	Pt. 2	-230.3	-1655.0
Z	34	Pt. 3	-350.3	-1655.0
		Pt. 4	-350.2	-1565.0
		Pt. 5	-230.4	-1565.0
		Pt. 6	-230.4	-1575.2

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_228880 g	5	7.5	5
Surface_228882 g	5	7.5	5
Surface_228884 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_228880 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_228882 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_228884 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228872	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228878	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228880 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_228882 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_228883	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228884 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

Block 13, Level 3: PH 1a lvl2 restaurant

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	5	Number of Floors	1
Number of Facades	6		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	-230.3	-1636.0
Y	0	Pt. 2	-230.3	-1655.0
Z	34	Pt. 3	-350.3	-1655.0
		Pt. 4	-350.2	-1565.0
		Pt. 5	-230.4	-1565.0
		Pt. 6	-230.4	-1575.2

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_228880 g	5	7.5	5
Surface_228882 g	5	7.5	5
Surface_228884 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_228880 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_228882 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_228884 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228872	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228878	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228880 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_228882 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_228883	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228884 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2

Alternative A: Base Case

Block 14, Level 3: PH 1a casino clerestory

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	15 ft
Zoning	Custom	Plenum Height	1 ft
Number of Zones	1	Number of Floors	1
Number of Facades	9		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	28.8	-1699.9
Y	0	Pt. 2	17.2	-1734.3
Z	34	Pt. 3	16.3	-1745.0
		Pt. 4	-499.2	-1745.2
		Pt. 5	-454.5	-1699.9
		Pt. 6	-50.3	-1699.9
		Pt. 7	-50.3	-1715.0
		Pt. 8	9.7	-1715.0
		Pt. 9	9.7	-1699.9

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228890	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228891	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228892	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228893	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228894	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228895	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228896	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228897	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228898	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

Block 14, Level 3: PH 1a casino clerestory

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	15 ft
Zoning	Custom	Plenum Height	1 ft
Number of Zones	1	Number of Floors	1
Number of Facades	9		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	28.8	-1699.9
Y	0	Pt. 2	17.2	-1734.3
Z	34	Pt. 3	16.3	-1745.0
		Pt. 4	-499.2	-1745.2
		Pt. 5	-454.5	-1699.9
		Pt. 6	-50.3	-1699.9
		Pt. 7	-50.3	-1715.0
		Pt. 8	9.7	-1715.0
		Pt. 9	9.7	-1699.9

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228890	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228891	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228892	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228893	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228894	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228895	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228896	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228897	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228898	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

Block 15, Level 3: PH 2 lvl2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	12	Number of Floors	1
Number of Facades	27		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	249	Pt. 1	76.7	-1840.2
Y	-1735	Pt. 2	134.3	-1819.2
Z	72	Pt. 3	150.2	-1849.5
		Pt. 4	177.5	-1877.2
		Pt. 5	218.5	-1897.5
		Pt. 6	276.6	-1900.1
		Pt. 7	277.9	-1907.6
		Pt. 8	281.9	-1929.3
		Pt. 9	286.9	-1956.6
		Pt. 10	289.0	-1956.3
		Pt. 11	292.1	-1991.7
		Pt. 12	273.6	-1993.7
		Pt. 13	273.5	-1992.1
		Pt. 14	265.1	-1992.7
		Pt. 15	266.6	-2017.0
		Pt. 16	191.0	-2017.0
		Pt. 17	191.0	-2008.2
		Pt. 18	127.8	-2008.2
		Pt. 19	127.8	-1992.9
		Pt. 20	71.7	-1951.6
		Pt. 21	71.7	-1957.0
		Pt. 22	-53.0	-1957.0
		Pt. 23	-53.4	-1833.0
		Pt. 24	11.0	-1833.0
		Pt. 25	11.0	-1775.0
		Pt. 26	62.5	-1775.0
		Pt. 27	70.3	-1822.4

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_270336	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270337	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270338	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270339	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270340	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270341	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270342	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270352	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270353	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270371	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270372	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

Block 15, Level 3: PH 2 lvl2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	12	Number of Floors	1
Number of Facades	27		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	249	Pt. 1	76.7	-1850.2
Y	-1745	Pt. 2	134.3	-1829.2
Z	72	Pt. 3	150.2	-1859.5
		Pt. 4	177.5	-1887.2
		Pt. 5	218.5	-1907.5
		Pt. 6	276.6	-1910.1
		Pt. 7	277.9	-1917.6
		Pt. 8	281.9	-1939.3
		Pt. 9	286.9	-1966.6
		Pt. 10	289.0	-1966.3
		Pt. 11	292.1	-2001.7
		Pt. 12	273.6	-2003.7
		Pt. 13	273.5	-2002.1
		Pt. 14	265.1	-2002.7
		Pt. 15	266.6	-2027.0
		Pt. 16	191.0	-2027.0
		Pt. 17	191.0	-2018.2
		Pt. 18	127.8	-2018.2
		Pt. 19	127.8	-2002.9
		Pt. 20	71.7	-1961.6
		Pt. 21	71.7	-1967.0
		Pt. 22	-53.0	-1967.0
		Pt. 23	-53.4	-1843.0
		Pt. 24	11.0	-1843.0
		Pt. 25	11.0	-1785.0
		Pt. 26	62.5	-1785.0
		Pt. 27	70.3	-1832.4

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_270155	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270156	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270157	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270158	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270159	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270160	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270161	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270192	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270193	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270221	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270222	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

Surf_270373	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270374	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270375	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270378	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270380	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270382	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270385	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270386	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270387	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270388	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270389	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270390	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270391	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270392	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270393	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270394	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

Surface_270223	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270224	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270225	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270228	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270230	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270232	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270235	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270236	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270237	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270238	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270239	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270240	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270241	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270242	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270243	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270244	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

Block 16, Level 3: PH 3 lvl2

Block Information	
Shape	CUSTOMBLK
Zoning	Custom
Number of Zones	7
Number of Facades	40

Ceiling and Plenum Heights	
Floor to Floor Height	13 ft
Plenum Height	4 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	249.75	Pt. 1	287.55	-1905.42
Y	-1734.52	Pt. 2	332.65	-1906.72
Z	72	Pt. 3	377.35	-1915.52
		Pt. 4	420.15	-1932.42
		Pt. 5	415.85	-1941.42
		Pt. 6	453.35	-1964.72
		Pt. 7	447.35	-1972.72
		Pt. 8	460.45	-1983.02
		Pt. 9	478.25	-2000.52
		Pt. 10	472.05	-2007.52
		Pt. 11	488.35	-2027.12
		Pt. 12	505.95	-2054.12
		Pt. 13	518.35	-2079.52
		Pt. 14	529.35	-2113.62
		Pt. 15	519.85	-2115.82
		Pt. 16	519.85	-2157.52
		Pt. 17	434.15	-2157.52
		Pt. 18	430.15	-2134.52
		Pt. 19	422.45	-2112.92
		Pt. 20	412.55	-2095.22
		Pt. 21	398.25	-2077.22
		Pt. 22	380.75	-2061.82
		Pt. 23	367.05	-2053.02
		Pt. 24	345.75	-2053.02
		Pt. 25	345.75	-2033.22
		Pt. 26	324.25	-2033.22
		Pt. 27	324.25	-2038.02
		Pt. 28	306.05	-2037.62
		Pt. 29	292.15	-2033.12
		Pt. 30	275.15	-2021.82
		Pt. 31	270.15	-2016.52
		Pt. 32	267.35	-2016.52
		Pt. 33	265.85	-1992.22
		Pt. 34	274.25	-1991.62
		Pt. 35	274.35	-1993.22
		Pt. 36	292.85	-1991.22
		Pt. 37	289.75	-1955.82
		Pt. 38	287.65	-1956.12
		Pt. 39	282.65	-1928.82
		Pt. 40	278.65	-1907.12

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Alternative A: Mitigated Case

Block 16, Level 3: PH 3 lvl2

Block Information	
Shape	CUSTOMBLK
Zoning	Custom
Number of Zones	7
Number of Facades	40

Ceiling and Plenum Heights	
Floor to Floor Height	13 ft
Plenum Height	4 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	249.75	Pt. 1	287.55	-1905.42
Y	-1734.52	Pt. 2	332.65	-1906.72
Z	72	Pt. 3	377.35	-1915.52
		Pt. 4	420.15	-1932.42
		Pt. 5	415.85	-1941.42
		Pt. 6	453.35	-1964.72
		Pt. 7	447.35	-1972.72
		Pt. 8	460.45	-1983.02
		Pt. 9	478.25	-2000.52
		Pt. 10	472.05	-2007.52
		Pt. 11	488.35	-2027.12
		Pt. 12	505.95	-2054.12
		Pt. 13	518.35	-2079.52
		Pt. 14	529.35	-2113.62
		Pt. 15	519.85	-2115.82
		Pt. 16	519.85	-2157.52
		Pt. 17	434.15	-2157.52
		Pt. 18	430.15	-2134.52
		Pt. 19	422.45	-2112.92
		Pt. 20	412.55	-2095.22
		Pt. 21	398.25	-2077.22
		Pt. 22	380.75	-2061.82
		Pt. 23	367.05	-2053.02
		Pt. 24	345.75	-2053.02
		Pt. 25	345.75	-2033.22
		Pt. 26	324.25	-2033.22
		Pt. 27	324.25	-2038.02
		Pt. 28	306.05	-2037.62
		Pt. 29	292.15	-2033.12
		Pt. 30	275.15	-2021.82
		Pt. 31	270.15	-2016.52
		Pt. 32	267.35	-2016.52
		Pt. 33	265.85	-1992.22
		Pt. 34	274.25	-1991.62
		Pt. 35	274.35	-1993.22
		Pt. 36	292.85	-1991.22
		Pt. 37	289.75	-1955.82
		Pt. 38	287.65	-1956.12
		Pt. 39	282.65	-1928.82
		Pt. 40	278.65	-1907.12

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Alternative A: Base Case

VisualDOE 4.1 - Architectural Details **April 3, 2014**

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_270395	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270396	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270397	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270398	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270399	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270400	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270403	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270404	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270411	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270412	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270413	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270414	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270415	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270416	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270417	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270424	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270425	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270426	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270427	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270428	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270429	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270430	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270431	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270432	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270441	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270442	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270443	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270444	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270445	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270446	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270447	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270448	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270449	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270450	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270452	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270453	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270454	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270455	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270456	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270457	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative A: Mitigated Case

VisualDOE 4.1 - Architectural Details **April 3, 2014**

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_270245	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270246	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270247	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270248	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270249	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270250	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270253	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270254	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270276	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270277	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270278	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270279	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270280	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270281	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270282	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270302	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270303	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270304	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270305	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270306	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270307	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270308	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270309	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270310	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270319	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270320	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270321	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270322	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270323	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270324	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270325	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270326	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270327	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270328	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270330	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270331	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270332	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270333	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270334	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270335	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

Block 17, Level 1: Kitchen MAU

Block Information	
Shape	Rect
Zoning	Single
Zone Depth	10 ft
Number of Zones	2
Number of Facades	4

Ceiling and Plenum Heights	
Floor to Floor Height	13 ft
Plenum Height	4 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Widths (ft)		Depths (ft)	
X	-2000	Width	1	Depth	1
Y	0				
Z	0				

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	~Adiabatic Roof	0.001	1.5
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_395826	n.a.	n.a.	n.a.	n.a.	int wall	0.001	5.3
Surf_395827	n.a.	n.a.	n.a.	n.a.	int wall	0.001	5.3
Surf_395828	n.a.	n.a.	n.a.	n.a.	int wall	0.001	5.3
Surf_395829	n.a.	n.a.	n.a.	n.a.	int wall	0.001	5.3

Alternative A: Mitigated Case

Block 17, Level 1: Kitchen MAU

Block Information	
Shape	Rect
Zoning	Single
Zone Depth	10 ft
Number of Zones	2
Number of Facades	4

Ceiling and Plenum Heights	
Floor to Floor Height	13 ft
Plenum Height	4 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Widths (ft)		Depths (ft)	
X	-2000	Width	1	Depth	1
Y	0				
Z	0				

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	~Adiabatic Roof	0.001	1.5
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_400392	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surf_400393	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surf_400394	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surf_400395	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative A: Base Case

VisualDOE 4.1 - Architectural Summary **April 3, 2014**

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt A Base Case
Case Description: Full build-out Phase 1A 1B 2 3 4
Gross Area: 2,453,744 ft²
Conditioned Area: 1,287,503 ft²
Window-Wall-Ratio: 15.3%
Skylight-Roof-Ratio: 0.0%
Number of Blocks: 17
Note: This report includes floor multipliers

Occupancies Summary

Name	Area (ft²)	Avg. LPD (W/ft²)	Avg. EPD (W/ft²)
Office	300,942	1.0	0.85
Hotel	561,794	1.0	0.5
Casino Gaming	139,878	1.6	10.0
Restaurant	92,710	1.6	0.79
Garage	1,166,241	0.3	0.2
Retail	8,572	1.6	1.0
Assembly	183,606	1.2	0.25
Restaurant VAV	1	1.6	0.79
Building Totals & Averages	2,453,744	0.74	0.94

Constructions Summary

Name	Net Area (ft²)	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)	Absorptance	Type	Category	Layers
Simulated Slab	1,025,839	0.03	45.6	0.0	Slabs	Light	3
Partition	397,544	0.39	1.04	0.3	Partitions	Light	3
Gyp. bd. ceiling	1,716,738	0.74	0.52	0.7	Ceilings	Light	1
Int Floor	5,248,850	0.18	9.33	0.7	Floors	Light	3
wl Z5 NR 90.1-07	642,285	0.06	0.2	0.7	Walls	Light	n.a.
rf Z5 NR 90.1-07	1,179,736	0.05	0.93	0.7	Roofs	Light	n.a.
int wall	52	0.0	5.33	0.0	Walls	Light	n.a.
MC Roof	34,626	0.03	0.93	0.55	Roofs	Light	n.a.

Fenestrations Summary

Name	Ucog (Btu/h-ft²-°F)	SHGC	Tvis	North (ft²)	East (ft²)	South (ft²)	West (ft²)	Total (ft²)	No.
Hotel window	0.550	0.404	0.700	5,940	35,640	5,940	35,640	83,160	3360
7.5ft	0.450	0.353	0.700	7,688	3,675	7,013	4,800	23,175	618
Building Totals & Averages	0.528	0.393	0.700	13,628	39,315	12,953	40,440	106,335	3,978

Alternative A: Mitigated Case

VisualDOE 4.1 - Architectural Summary **April 3, 2014**

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt A Design Case
Case Description: Full build-out Phase 1A 1B 2 3 4
Gross Area: 2,453,744 ft²
Conditioned Area: 1,287,503 ft²
Window-Wall-Ratio: 15.3%
Skylight-Roof-Ratio: 0.0%
Number of Blocks: 17
Note: This report includes floor multipliers

Occupancies Summary

Name	Area (ft²)	Avg. LPD (W/ft²)	Avg. EPD (W/ft²)
Office	300,942	1.0	0.85
Casino Gaming	139,878	1.6	10.0
Restaurant	92,711	1.6	0.79
Garage	1,166,241	0.3	0.2
Retail	8,572	1.6	1.0
Assembly	183,606	1.2	0.25
HtlRoomCtrl	561,794	0.5	0.5
Building Totals & Averages	2,453,744	0.63	0.94

Constructions Summary

Name	Net Area (ft²)	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)	Absorptance	Type	Category	Layers
garage rf	280,634	0.25	10.62	0.7	Roofs	Light	4
Simulated Slab	1,023,745	0.03	45.6	0.0	Slabs	Light	3
Partition	397,544	0.39	1.04	0.3	Partitions	Light	3
Gyp. bd. ceiling	1,716,738	0.74	0.52	0.7	Ceilings	Light	1
Int Floor	5,223,530	0.18	9.33	0.7	Floors	Light	3
MC Wall	642,337	0.04	0.2	0.7	Walls	Light	n.a.
MC Roof	944,098	0.03	0.93	0.55	Roofs	Light	n.a.

Fenestrations Summary

Name	Ucog (Btu/h-ft²-°F)	SHGC	Tvis	North (ft²)	East (ft²)	South (ft²)	West (ft²)	Total (ft²)	No.
Hotel window	0.550	0.404	0.700	5,940	35,640	5,940	35,640	83,160	3360
7.5ft	0.450	0.353	0.700	7,688	3,675	7,013	4,800	23,175	618
Building Totals & Averages	0.528	0.393	0.700	13,628	39,315	12,953	40,440	106,335	3,978

Alternative A: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt A Base Case
Case Description: Full build-out Phase 1A 1B 2 3 4
Number of Blocks: 17

Zone Loads

Name	Area (ft²)	LPD (W/ft²)	EPD (W/ft²)	Occupancy	Occupant Density (ft²/person)	Daylight Control	Illuminance (fc)	Control Fraction	Infiltration (ach)	SS-G Max Cl/Ht (kBtu/h)
Room_0120 htl	88200	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_6005 toilet 17	7343	1.20	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./65.31
Room_7000 office 17	4828	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./55.16
Room_7001 office 8	12027	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./80.65
Room_7002 office 8	16059	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./108.16
Room_7003 office 6	10766	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./79.85
Room_7004 office 5	6124	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./53.6
Room_7005 office 5	495	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./8.22
Room_7006 office 6	1776	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./64.25
Room_7007 office 5	1256	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./45.15
Room_7008 office 6	742	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./26.7
Room_7009 office 5	1075	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./42.48
Room_7011 corr 14	9115	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./80.06
Room_7013 office 18	2094	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./22.91
Room_7012 locker 7	3219	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./38.13
Room_7014 office 1	25237	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./144.52
Room_7015 office 2	9696	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./47.78
Room_7016 storage	12364	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./71.55
Room_7017 office 2	2611	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./67.01
Room_7018 Office 52	2607	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./55.17
Room_7019 office 52	12246	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./96.14
Room_7020 office 52	1662	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./41.59
Room_7021 office 52	1745	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./22.85
Room_7022 office 14	2199	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./70.8
Room_7023 office 51	6052	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./48.01
Room_9001 uncond	3096	.00	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9002 ph1 garage PL	498436	.30	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.

Alternative A: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt A Design Case
Case Description: Full build-out Phase 1A 1B 2 3 4
Number of Blocks: 17

Zone Loads

Name	Area (ft²)	LPD (W/ft²)	EPD (W/ft²)	Occupancy	Occupant Density (ft²/person)	Daylight Control	Illuminance (fc)	Control Fraction	Infiltration (ach)	SS-G Max Cl/Ht (kBtu/h)
Room_0120 htl	88200	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	68.27/33.64
Room_6005 toilet 17	7343	.95	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./111.79
Room_7000 office 17	4828	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./82.67
Room_7001 office 8	12027	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./171.63
Room_7002 office 8	16059	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./228.43
Room_7003 office 6	10766	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./159.95
Room_7004 office 5	6124	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./101.91
Room_7005 office 5	495	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./11.53
Room_7006 office 6	1776	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./69.54
Room_7007 office 5	1256	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./49.09
Room_7008 office 6	742	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./28.15
Room_7009 office 5	1075	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./45.38
Room_7011 corr 14	9115	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./153.02
Room_7013 office 18	2094	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./33.65
Room_7012 locker 7	3219	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./57.34
Room_7014 office 1	25237	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./297.41
Room_7015 office 2	9696	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./111.99
Room_7016 storage	12364	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./139.87
Room_7017 office 2	2611	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./75.74
Room_7018 Office 52	2607	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./70.03
Room_7019 office 52	12246	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./195.4
Room_7020 office 52	1662	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./48.5
Room_7021 office 52	1745	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./33.13
Room_7022 office 14	2199	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./75.83
Room_7023 office 51	6052	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./99.96
Room_8006 BOH 36 PL	4925	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./64.88
Room_8007 BOH 32	1165	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./24.25

Alternative A: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_9003 garage 2	177216	.30	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9004 ph2 garage	468075	.30	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9005 loading	19418	.30	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_7050 47	6524	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./42.24
Room_7051 53-54	3069	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./14.78
Room_7052 53-54	8217	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./26.86
Room_7053 55	10482	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./41.89
Room_7054 56	9444	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./42.45
Room_7055 53-54	1640	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./10.66
Room_7056 53-54	965	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./6.11
Room_7057 53-54	565	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./5.16
Room_7058 56	1015	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./6.21
Room_7059 56	2785	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./16.61
Room_7060 53-54	1631	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./10.79
Room_7061 53-54	870	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./6.69
Room_7062 57	5666	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./38.25
Room_7063 57	10484	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./50.18
Room_7064 58	3495	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./23.46
Room_7065 58	9778	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./42.38
Room_7066 58	1079	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./9.36
Room_7067 57	2448	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./15.95
Room_7068 58	1677	.90	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./13.56
Room_8015 BOH 50	1910	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./18.92
Room_8014 BOH 50	675	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./10.68
Room_8013 BOH 50	3369	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./31.98
Room_8012 BOH 50	1910	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./73.64
Room_8011 BOH 50	675	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./10.73
Room_8010 BOH 40	4661	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./44.37
Room_8009 BOH 32	11617	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./87.22
Room_8008 BOH 32	2601	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./34.35
Room_8007 BOH 32	1165	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./16.27
Room_8006 BOH 36	4925	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./41.13
Room_6000 casino slots	72747	1.60	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./n.a.
Room_6004 casino cs	21617	.00	.00	Casino Gaming	100000.0	None	n.a.	n.a.	0.2	n.a./425.18
Room_6001 casino	1151	1.60	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./54.11
Room_6002 casino	1963	1.60	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./76.76
Room_6003 casino	64018	1.60	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./n.a.
Room_5021 bar 31	6046	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./288.3
Room_5020 restaurant 48	1850	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./233.96
Room_5019 restaurant 48	1125	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./158.1

Alternative A: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_8008 BOH 32	2601	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./51.83
Room_8009 BOH 32	11617	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./178.74
Room_8010 BOH 40	4661	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./71.95
Room_8011 BOH 50	675	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./15.28
Room_8012 BOH 50	1910	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./79.14
Room_8013 BOH 50	3369	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./61.29
Room_8014 BOH 50	675	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./15.09
Room_8015 BOH 50	1910	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./37.61
Room_9001 uncond	3096	.00	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9002 ph1 garage PL	498436	.10	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9003 garage 2	177216	.10	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9004 ph2 garage	468075	.10	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9005 loading	19418	.10	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_7067 47	6524	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./76.07
Room_7068 53-54	3069	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./34.02
Room_7050 53-54	8217	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./74.28
Room_7051 55	10482	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./97.4
Room_7052 56	9444	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./91.03
Room_7053 53-54	1640	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./17.71
Room_7054 53-54	965	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./10.55
Room_7055 53-54	565	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./8.35
Room_7056 53-54	1015	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./10.93
Room_7057 56	2785	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./28.15
Room_7058 53-54	1631	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./17.69
Room_7059 53-54	870	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./11.27
Room_7060 57	5666	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./60.51
Room_7061 57	10484	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./102.3
Room_7062 58	3495	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./40.02
Room_7063 58	9778	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./92.23
Room_7064 58	1079	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./13.12
Room_7065 57	2448	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./26.59
Room_7066 58	1677	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./20.76
Room_6000 casino slots	72747	1.28	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./n.a.
Room_6004 casino cs	21617	.00	.00	Casino Gaming	100000.0	None	n.a.	n.a.	0.2	n.a./427.69
Room_6001 casino	1151	1.28	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./29.7
Room_6002 casino	1963	1.28	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./98.5
Room_6003 casino	64018	1.28	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./819.77
Room_5021 bar 31	6046	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./554.39
Room_5020 restaurant 48	1850	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./362.03

Alternative A: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_5018 restaurant 48	1612	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./147.44
Room_5017 restaurant 48	3528	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./186.95
Room_5016 kitchen 49	2677	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./142.47
Room_5015 coffee 38	8098	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./422.39
Room_5014 lounge 31	827	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./105.75
Room_5013 lounge 31	2474	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./126.41
Room_5012 kitchen 34	4112	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./206.73
Room_5011 dining 35	7119	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./327.35
Room_5010 dining 33	9722	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./476.8
Room_5009 dining 33	545	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./37.5
Room_5008 food court 13	5479	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./268.41
Room_5007 buffet 10	11243	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./547.74
Room_5006 dining 9	2977	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./158.36
Room_5005 kitchen 11	5739	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./291.05
Room_5004 kitchen 11	720	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./44.67
Room_5003 kitchen 11 PL2	1358	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./73.46
Room_5002 kitchen 12 PL	5231	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./241.01
Room_5001 rest 9	1578	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./146.5
Room_5000 bar 16	8650	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./376.45
Room_4778 wtrprk	2175	1.20	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./42.22
Room_4779 wtrprk	2175	1.20	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./42.89
Room_4780 wtrprk	2175	1.20	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./40.98
Room_4781 wtrprk	2175	1.20	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./41.61
Room_4782 wtrprk PL	16900	1.20	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./257.7
Room_3002 retail 18	296	1.50	1.00	Retail	300.0	None	n.a.	n.a.	0.2	n.a./15.47
Room_3001 retail 18	5275	1.50	1.00	Retail	300.0	None	n.a.	n.a.	0.2	n.a./254.49
Room_3000 Retail 18	3001	1.50	1.00	Retail	300.0	None	n.a.	n.a.	0.2	n.a./249.43
Room_8000 mech	2372	1.00	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./37.17
Room_8001 mech	1226	1.00	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./22.89
Room_8002 mech	1114	1.00	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./16.86
Room_8003 mech	22676	1.00	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./303.94
Room_8004 mech	4282	1.00	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./50.09
Room_8005 mech 14	597	1.00	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./13.23
Room_1000 corr 45-46	16248	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1673.21
Room_1002 circ 44	881	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./61.21
Room_1004 circ 44	5378	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./325.97

Alternative A: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_5019 restaurant 48	1125	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./232.14
Room_5018 restaurant 48	1612	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./195.9
Room_5017 restaurant 48	3528	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./324.25
Room_5016 kitchen 49	2677	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./246.77
Room_5015 coffee 38	8098	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./718.07
Room_5014 lounge 31	827	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./158.09
Room_5013 lounge 31	2474	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./228.08
Room_5012 kitchen 34	4112	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./371.68
Room_5011 dining 35	7119	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./613.01
Room_5010 dining 33	9722	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./891.41
Room_5009 dining 33	545	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./52.76
Room_5008 food court 13	5479	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./482.74
Room_5007 buffet 10	11243	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./1032.4
Room_5006 dining 9	2977	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./280.82
Room_5005 kitchen 11	5739	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./527.54
Room_5004 kitchen 11	720	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./67.92
Room_5003 kitchen 11 PL2	1358	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./125.68
Room_5002 kitchen 12 PL	5231	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./446.45
Room_5001 rest 9	1578	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./201.39
Room_5000 bar 16	8650	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./740.53
Room_4778 wtrprk	2175	.90	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./122.49
Room_4779 wtrprk	2175	.90	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./124.81
Room_4780 wtrprk	2175	.90	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./119.75
Room_4781 wtrprk	2175	.90	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./120.1
Room_4782 wtrprk PL	16900	.90	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./878.8
Room_3002 retail 18	296	1.20	1.00	Retail	300.0	None	n.a.	n.a.	0.2	n.a./13.62
Room_3001 retail 18	5275	1.20	1.00	Retail	300.0	None	n.a.	n.a.	0.2	n.a./233.83
Room_3000 Retail 18	3001	1.20	1.00	Retail	300.0	None	n.a.	n.a.	0.2	n.a./240.62
Room_8000 mech	2372	.80	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./11.1
Room_8001 mech	1226	.80	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./8.87
Room_8002 mech	1114	.80	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./5.08
Room_8003 mech	22676	.80	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./36.68
Room_8004 mech	4282	.80	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./1.89
Room_8005 mech 14	597	.80	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./4.48
Room_1000 corr 45-46	16248	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1636.34
Room_1002 circ 44	881	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./55.91

Alternative A: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_1005 circ 44	6548	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./573.2 2
Room_1006 circ 44	2585	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./183.2 8
Room_1007 warehouse 4	22440	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1315. 8
Room_1008 banquet 36	4573	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./275.8 2
Room_1009 lobby 15	9429	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./644.4 4
Room_1010 corr 37	7067	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./437.8 3
Room_1011 corr 37	4712	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./331.5 5
Room_1012 circ 19	11138	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./681.5
Room_1013 circ 39	8982	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./531.5 1
Room_1015 BOH 3	10369	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./656.1 8
Room_1016 warehouse	18589	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1105. 84
Room_1017 BOH 40	2648	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./165.0 9
Room_1018 BOH 40	2007	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./136.7 6
Room_0121 htl	9000	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0122 htl	40578	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0123 htl	40476	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0124 htl	9011	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0126 htl	88202	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0127 htl	40578	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0128 htl	40476	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0129 htl	9011	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0130 htl	9000	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0135 htl ph4	88200	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0136 htl ph4	9000	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0137 htl ph4	40578	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0138 htl ph4	40476	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0139 htl ph4	9011	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_1014 meeting 40	8556	1.20	.75	Assembly	8.0	None	n.a.	n.a.	0.2	n.a./1143. 31
Room_1003 meeting 41-43	15860	1.20	.75	Assembly	8.0	None	n.a.	n.a.	0.2	n.a./2119. 36
Kitchen MAU	1	.00	.00	Restaurant VAV	1000.0	None	n.a.	n.a.	0.2	n.a./3144. 02

Supply Air

Name	Total Flow (cfm)	Flow/Area (cfm/ft²)	Air change/hour	Min. Flow Ratio	Cool/Heat Cap. (kBtu/hr)
Room_0120 htl	AutoSized - 5680	0	0	1	n.a.
Room_6005 toilet 17	AutoSized - 7835	0	0	0.3	n.a. / 528.9
Room_7000 office 17	AutoSized - 6025	0	0	0.3	n.a. / 406.7
Room_7001 office 8	AutoSized - 11527	0	0	0.3	n.a. / 778.1
Room_7002 office 8	AutoSized - 14696	0	0	0.3	n.a. / 992.0
Room_7003 office 6	AutoSized - 10242	0	0	0.3	n.a. / 691.3
Room_7004 office 5	AutoSized - 6015	0	0	0.3	n.a. / 406.0

Alternative A: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_1004 circ 44	5378	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./311.6 3
Room_1005 circ 44	6548	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./558.9 3
Room_1006 circ 44	2585	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./164.1 4
Room_1007 warehouse 4	22440	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1267. 8
Room_1008 banquet 36	4573	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./263.0 7
Room_1009 lobby 15	9429	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./625.2 1
Room_1010 corr 37	7067	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./424.7 7
Room_1011 corr 37	4712	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./304.3 6
Room_1012 circ 19	11138	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./656.7 9
Room_1013 circ 39	8982	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./511.0 2
Room_1015 BOH 3	10369	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./635.5 3
Room_1016 warehouse	18589	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1066. 57
Room_1017 BOH 40	2648	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./159.6 3
Room_1018 BOH 40	2007	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./130.7 4
Room_0121 htl	9000	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	16.19/18. 03
Room_0122 htl	40578	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	81.95/57. 26
Room_0123 htl	40476	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	58.47/69. 22
Room_0124 htl	9011	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	8.3/9.39
Room_0126 htl	88202	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	70.5/23.9 8
Room_0127 htl	40578	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	91.64/61. 7
Room_0128 htl	40476	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	68.1/68.6 4
Room_0129 htl	9011	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	15.14/15. 36
Room_0130 htl	9000	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	8.48/10.5 2
Room_0135 htl ph4	88200	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	70.82/24. 57
Room_0136 htl ph4	9000	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	19.06/18. 38
Room_0137 htl ph4	40578	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	92.27/61. 48
Room_0138 htl ph4	40476	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	70.36/68. 21
Room_0139 htl ph4	9011	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	16.7/15.2 4
Room_1003 meeting 41-43	15860	.96	.75	Assembly	8.0	None	n.a.	n.a.	0.2	n.a./2119. 37
Room_1014 meeting 40	8556	.96	.75	Assembly	8.0	None	n.a.	n.a.	0.2	n.a./1143. 31
Kitchen MAU	1	.00	.00	Restaurant	1000.0	None	n.a.	n.a.	0.2	n.a./3145. 11

Supply Air

Name	Total Flow (cfm)	Flow/Area (cfm/ft²)	Air change/hour	Min. Flow Ratio	Cool/Heat Cap. (kBtu/hr)
Room_0120 htl	AutoSized - 5361	0	0	1	225.3 / 289.1
Room_6005 toilet 17	AutoSized - 7370	0	0	0.3	n.a. / 497.5

Alternative A: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_7005 office 5	AutoSized - 565	0	0	0.3	n.a. / 38.2
Room_7006 office 6	AutoSized - 3992	0	0	0.3	n.a. / 269.4
Room_7007 office 5	AutoSized - 1864	0	0	0.3	n.a. / 125.8
Room_7008 office 6	AutoSized - 1903	0	0	0.3	n.a. / 128.4
Room_7009 office 5	AutoSized - 2378	0	0	0.3	n.a. / 160.5
Room_7011 corr 14	AutoSized - 8620	0	0	0.3	n.a. / 581.8
Room_7013 office 18	AutoSized - 1895	0	0	0.3	n.a. / 127.9
Room_7012 locker 7	AutoSized - 3143	0	0	0.3	n.a. / 212.2
Room_7014 office 1	AutoSized - 22112	0	0	0.3	n.a. / 1492.6
Room_7015 office 2	AutoSized - 8413	0	0	0.3	n.a. / 567.9
Room_7016 storage	AutoSized - 10537	0	0	0.3	n.a. / 711.2
Room_7017 office 2	AutoSized - 5392	0	0	0.3	n.a. / 364.0
Room_7018 Office 52	AutoSized - 3515	0	0	0.3	n.a. / 237.2
Room_7019 office 52	AutoSized - 11867	0	0	0.3	n.a. / 801.1
Room_7020 office 52	AutoSized - 3282	0	0	0.3	n.a. / 221.6
Room_7021 office 52	AutoSized - 1688	0	0	0.3	n.a. / 113.9
Room_7022 office 14	AutoSized - 3017	0	0	0.3	n.a. / 203.7
Room_7023 office 51	AutoSized - 6039	0	0	0.3	n.a. / 407.6
Room_9001 uncond	unconditioned	0	0	0.3	n.a.
Room_9002 ph1 garage PL	unconditioned	0	0	0.3	n.a.
Room_9003 garage 2	unconditioned	0	0	0.3	n.a.
Room_9004 ph2 garage	unconditioned	0	0	0.3	n.a.
Room_9005 loading	unconditioned	0	0	0.3	n.a.
Room_7050 47	AutoSized - 5560	0	0	0.3	n.a. / 375.3
Room_7051 53-54	AutoSized - 2690	0	0	0.3	n.a. / 181.6
Room_7052 53-54	AutoSized - 6988	0	0	0.3	n.a. / 471.7
Room_7053 55	AutoSized - 8794	0	0	0.3	n.a. / 593.6
Room_7054 56	AutoSized - 7951	0	0	0.3	n.a. / 536.7
Room_7055 53-54	AutoSized - 1521	0	0	0.3	n.a. / 102.7
Room_7056 53-54	AutoSized - 878	0	0	0.3	n.a. / 59.2
Room_7057 53-54	AutoSized - 576	0	0	0.3	n.a. / 38.9
Room_7058 56	AutoSized - 931	0	0	0.3	n.a. / 62.8
Room_7059 56	AutoSized - 2512	0	0	0.3	n.a. / 169.6
Room_7060 53-54	AutoSized - 1515	0	0	0.3	n.a. / 102.3
Room_7061 53-54	AutoSized - 877	0	0	0.3	n.a. / 59.2
Room_7062 57	AutoSized - 4891	0	0	0.3	n.a. / 330.2
Room_7063 57	AutoSized - 8828	0	0	0.3	n.a. / 595.9
Room_7064 58	AutoSized - 3132	0	0	0.3	n.a. / 211.4

Alternative A: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_7000 office 17	AutoSized - 5816	0	0	0.3	n.a. / 392.6
Room_7001 office 8	AutoSized - 11127	0	0	0.3	n.a. / 751.1
Room_7002 office 8	AutoSized - 14145	0	0	0.3	n.a. / 954.8
Room_7003 office 6	AutoSized - 9884	0	0	0.3	n.a. / 667.2
Room_7004 office 5	AutoSized - 5808	0	0	0.3	n.a. / 392.0
Room_7005 office 5	AutoSized - 510	0	0	0.3	n.a. / 34.5
Room_7006 office 6	AutoSized - 3848	0	0	0.3	n.a. / 259.8
Room_7007 office 5	AutoSized - 1758	0	0	0.3	n.a. / 118.6
Room_7008 office 6	AutoSized - 1908	0	0	0.3	n.a. / 128.8
Room_7009 office 5	AutoSized - 2287	0	0	0.3	n.a. / 154.4
Room_7011 corr 14	AutoSized - 8290	0	0	0.3	n.a. / 559.6
Room_7013 office 18	AutoSized - 1782	0	0	0.3	n.a. / 120.3
Room_7012 locker 7	AutoSized - 2923	0	0	0.3	n.a. / 197.3
Room_7014 office 1	AutoSized - 21246	0	0	0.3	n.a. / 1434.1
Room_7015 office 2	AutoSized - 8102	0	0	0.3	n.a. / 546.9
Room_7016 storage	AutoSized - 10076	0	0	0.3	n.a. / 680.1
Room_7017 office 2	AutoSized - 5403	0	0	0.3	n.a. / 364.7
Room_7018 Office 52	AutoSized - 3313	0	0	0.3	n.a. / 223.7
Room_7019 office 52	AutoSized - 11464	0	0	0.3	n.a. / 773.8
Room_7020 office 52	AutoSized - 3140	0	0	0.3	n.a. / 211.9
Room_7021 office 52	AutoSized - 1549	0	0	0.3	n.a. / 104.6
Room_7022 office 14	AutoSized - 2839	0	0	0.3	n.a. / 191.6
Room_7023 office 51	AutoSized - 5835	0	0	0.3	n.a. / 393.8
Room_8006 BOH 36 PL	AutoSized - 4129	0	0	0.3	n.a. / 278.7
Room_8007 BOH 32	AutoSized - 1208	0	0	0.3	n.a. / 81.5
Room_8008 BOH 32	AutoSized - 2657	0	0	0.3	n.a. / 179.4
Room_8009 BOH 32	AutoSized - 11192	0	0	0.3	n.a. / 755.5
Room_8010 BOH 40	AutoSized - 3917	0	0	0.3	n.a. / 264.4
Room_8011 BOH 50	AutoSized - 715	0	0	0.3	n.a. / 48.2
Room_8012 BOH 50	AutoSized - 4873	0	0	0.3	n.a. / 329.0
Room_8013 BOH 50	AutoSized - 3246	0	0	0.3	n.a. / 219.1
Room_8014 BOH 50	AutoSized - 680	0	0	0.3	n.a. / 45.9
Room_8015 BOH 50	AutoSized - 1860	0	0	0.3	n.a. / 125.5
Room_9001 uncond	unconditioned	0	0	0.3	n.a.

Alternative A: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_7065 58	AutoSized - 8180	0	0	0.3	n.a. / 552.2
Room_7066 58	AutoSized - 1002	0	0	0.3	n.a. / 67.6
Room_7067 57	AutoSized - 2175	0	0	0.3	n.a. / 146.8
Room_7068 58	AutoSized - 1480	0	0	0.3	n.a. / 99.9
Room_8015 BOH 50	AutoSized - 1937	0	0	0.3	n.a. / 130.7
Room_8014 BOH 50	AutoSized - 728	0	0	0.3	n.a. / 49.1
Room_8013 BOH 50	AutoSized - 3358	0	0	0.3	n.a. / 226.7
Room_8012 BOH 50	AutoSized - 4993	0	0	0.3	n.a. / 337.0
Room_8011 BOH 50	AutoSized - 782	0	0	0.3	n.a. / 52.8
Room_8010 BOH 40	AutoSized - 4144	0	0	0.3	n.a. / 279.7
Room_8009 BOH 32	AutoSized - 11578	0	0	0.3	n.a. / 781.5
Room_8008 BOH 32	AutoSized - 2905	0	0	0.3	n.a. / 196.1
Room_8007 BOH 32	AutoSized - 1318	0	0	0.3	n.a. / 89.0
Room_8006 BOH 36	AutoSized - 4311	0	0	0.3	n.a. / 291.0
Room_6000 casino slots	AutoSized - 225563	0	0	1	n.a. / 15225.5
Room_6004 casino cs	AutoSized - 14455	0	0	1	n.a. / 975.7
Room_6001 casino	AutoSized - 5560	0	0	1	n.a. / 375.3
Room_6002 casino	AutoSized - 9705	0	0	1	n.a. / 655.1
Room_6003 casino	AutoSized - 226146	0	0	1	n.a. / 15264.9
Room_5021 bar 31	AutoSized - 9081	0	0	1	n.a. / 613.0
Room_5020 restaurant 48	AutoSized - 5728	0	0	1	n.a. / 386.6
Room_5019 restaurant 48	AutoSized - 3719	0	0	1	n.a. / 251.0
Room_5018 restaurant 48	AutoSized - 3221	0	0	1	n.a. / 217.4
Room_5017 restaurant 48	AutoSized - 5311	0	0	1	n.a. / 358.5
Room_5016 kitchen 49	AutoSized - 4048	0	0	1	n.a. / 273.2
Room_5015 coffee 38	AutoSized - 11788	0	0	1	n.a. / 795.7
Room_5014 lounge 31	AutoSized - 2536	0	0	1	n.a. / 171.2
Room_5013 lounge 31	AutoSized - 3741	0	0	1	n.a. / 252.5
Room_5012 kitchen 34	AutoSized - 6090	0	0	1	n.a. / 411.1
Room_5011 dining 35	AutoSized - 10055	0	0	1	n.a. / 678.7
Room_5010 dining 33	AutoSized - 14602	0	0	1	n.a. / 985.7
Room_5009 dining 33	AutoSized - 908	0	0	1	n.a. / 61.3
Room_5008 food court 13	AutoSized - 7934	0	0	1	n.a. / 535.5
Room_5007 buffet 10	AutoSized - 16911	0	0	1	n.a. / 1141.5
Room_5006 dining 9	AutoSized - 4597	0	0	1	n.a. / 310.3
Room_5005 kitchen 11	AutoSized - 8641	0	0	1	n.a. / 583.3

Alternative A: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_9002 ph1 garage PL	unconditioned	0	0	0.3	n.a.
Room_9003 garage 2	unconditioned	0	0	0.3	n.a.
Room_9004 ph2 garage	unconditioned	0	0	0.3	n.a.
Room_9005 loading	unconditioned	0	0	0.3	n.a.
Room_7067 47	AutoSized - 5326	0	0	0.3	n.a. / 359.5
Room_7068 53-54	AutoSized - 2549	0	0	0.3	n.a. / 172.1
Room_7050 53-54	AutoSized - 6681	0	0	0.3	n.a. / 451.0
Room_7051 55	AutoSized - 8441	0	0	0.3	n.a. / 569.8
Room_7052 56	AutoSized - 7618	0	0	0.3	n.a. / 514.2
Room_7053 53-54	AutoSized - 1401	0	0	0.3	n.a. / 94.6
Room_7054 53-54	AutoSized - 800	0	0	0.3	n.a. / 54.0
Room_7055 53-54	AutoSized - 544	0	0	0.3	n.a. / 36.7
Room_7056 53-54	AutoSized - 860	0	0	0.3	n.a. / 58.1
Room_7057 56	AutoSized - 2347	0	0	0.3	n.a. / 158.4
Room_7058 53-54	AutoSized - 1399	0	0	0.3	n.a. / 94.5
Room_7059 53-54	AutoSized - 800	0	0	0.3	n.a. / 54.0
Room_7060 57	AutoSized - 4641	0	0	0.3	n.a. / 313.3
Room_7061 57	AutoSized - 8459	0	0	0.3	n.a. / 571.0
Room_7062 58	AutoSized - 2901	0	0	0.3	n.a. / 195.8
Room_7063 58	AutoSized - 7855	0	0	0.3	n.a. / 530.2
Room_7064 58	AutoSized - 925	0	0	0.3	n.a. / 62.5
Room_7065 57	AutoSized - 2040	0	0	0.3	n.a. / 137.7
Room_7066 58	AutoSized - 1404	0	0	0.3	n.a. / 94.8
Room_6000 casino slots	AutoSized - 222490	0	0	0.3	n.a. / 15018.1
Room_6004 casino cs	AutoSized - 13617	0	0	0.3	n.a. / 919.1
Room_6001 casino	AutoSized - 5532	0	0	0.3	n.a. / 373.4
Room_6002 casino	AutoSized - 9724	0	0	0.3	n.a. / 656.4
Room_6003 casino	AutoSized - 223453	0	0	0.3	n.a. / 15083.1
Room_5021 bar 31	AutoSized - 8816	0	0	0.3	n.a. / 595.1
Room_5020 restaurant 48	AutoSized - 5757	0	0	0.3	n.a. / 388.6
Room_5019 restaurant 48	AutoSized - 3691	0	0	0.3	n.a. / 249.2
Room_5018 restaurant 48	AutoSized - 3115	0	0	0.3	n.a. / 210.3
Room_5017 restaurant 48	AutoSized - 5156	0	0	0.3	n.a. / 348.0
Room_5016 kitchen 49	AutoSized - 3924	0	0	0.3	n.a. / 264.9
Room_5015 coffee 38	AutoSized - 11418	0	0	0.3	n.a. / 770.7
Room_5014 lounge 31	AutoSized - 2514	0	0	0.3	n.a. / 169.7
Room_5013 lounge 31	AutoSized - 3627	0	0	0.3	n.a. / 244.8
Room_5012 kitchen 34	AutoSized - 5910	0	0	0.3	n.a. / 398.9
Room_5011 dining 35	AutoSized - 9748	0	0	0.3	n.a. / 658.0

Alternative A: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_5004 kitchen 11	AutoSized - 1123	0	0	1	n.a. / 75.8
Room_5003 kitchen 11 PL2	AutoSized - 2063	0	0	1	n.a. / 139.2
Room_5002 kitchen 12 PL	AutoSized - 7342	0	0	1	n.a. / 495.6
Room_5001 rest 9	AutoSized - 3299	0	0	1	n.a. / 222.7
Room_5000 bar 16	AutoSized - 12158	0	0	1	n.a. / 820.7
Room_4778 wtrprk	AutoSized - 2207	0	0	1	n.a. / 149.0
Room_4779 wtrprk	AutoSized - 2253	0	0	1	n.a. / 152.1
Room_4780 wtrprk	AutoSized - 2112	0	0	1	n.a. / 142.5
Room_4781 wtrprk	AutoSized - 2159	0	0	1	n.a. / 145.8
Room_4782 wtrprk PL	AutoSized - 15489	0	0	1	n.a. / 1045.5
Room_3002 retail 18	AutoSized - 246	0	0	1	n.a. / 16.6
Room_3001 retail 18	AutoSized - 4047	0	0	1	n.a. / 273.2
Room_3000 Retail 18	AutoSized - 3966	0	0	1	n.a. / 267.7
Room_8000 mech	AutoSized - 1996	0	0	1	n.a. / 134.7
Room_8001 mech	AutoSized - 1185	0	0	1	n.a. / 80.0
Room_8002 mech	AutoSized - 1075	0	0	1	n.a. / 72.6
Room_8003 mech	AutoSized - 19193	0	0	1	n.a. / 1295.5
Room_8004 mech	AutoSized - 3608	0	0	1	n.a. / 243.5
Room_8005 mech 14	AutoSized - 615	0	0	1	n.a. / 41.5
Room_1000 corr 45-46	AutoSized - 26607	0	0	0.3	n.a. / 1796.0
Room_1002 circ 44	AutoSized - 973	0	0	0.3	n.a. / 65.7
Room_1004 circ 44	AutoSized - 5183	0	0	0.3	n.a. / 349.9
Room_1005 circ 44	AutoSized - 9115	0	0	0.3	n.a. / 615.3
Room_1006 circ 44	AutoSized - 2914	0	0	0.3	n.a. / 196.7
Room_1007 warehouse 4	AutoSized - 20923	0	0	0.3	n.a. / 1412.3
Room_1008 banquet 36	AutoSized - 4386	0	0	0.3	n.a. / 296.1
Room_1009 lobby 15	AutoSized - 10248	0	0	0.3	n.a. / 691.7
Room_1010 corr 37	AutoSized - 6962	0	0	0.3	n.a. / 470.0
Room_1011 corr 37	AutoSized - 5272	0	0	0.3	n.a. / 355.9
Room_1012 circ 19	AutoSized - 10837	0	0	0.3	n.a. / 731.5
Room_1013 circ 39	AutoSized - 8452	0	0	0.3	n.a. / 570.5
Room_1015 BOH 3	AutoSized - 10434	0	0	0.3	n.a. / 704.3
Room_1016 warehouse	AutoSized - 17585	0	0	0.3	n.a. / 1187.0
Room_1017 BOH 40	AutoSized - 2625	0	0	0.3	n.a. / 177.2

Alternative A: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_5010 dining 33	AutoSized - 14175	0	0	0.3	n.a. / 956.8
Room_5009 dining 33	AutoSized - 839	0	0	0.3	n.a. / 56.6
Room_5008 food court 13	AutoSized - 7676	0	0	0.3	n.a. / 518.2
Room_5007 buffet 10	AutoSized - 16417	0	0	0.3	n.a. / 1108.1
Room_5006 dining 9	AutoSized - 4466	0	0	0.3	n.a. / 301.4
Room_5005 kitchen 11	AutoSized - 8389	0	0	0.3	n.a. / 566.2
Room_5004 kitchen 11	AutoSized - 1080	0	0	0.3	n.a. / 72.9
Room_5003 kitchen 11 PL2	AutoSized - 1999	0	0	0.3	n.a. / 134.9
Room_5002 kitchen 12 PL	AutoSized - 7099	0	0	0.3	n.a. / 479.2
Room_5001 rest 9	AutoSized - 3202	0	0	0.3	n.a. / 216.2
Room_5000 bar 16	AutoSized - 11776	0	0	0.3	n.a. / 794.9
Room_4778 wtrprk	AutoSized - 2053	0	0	0.3	n.a. / 138.6
Room_4779 wtrprk	AutoSized - 2091	0	0	0.3	n.a. / 141.2
Room_4780 wtrprk	AutoSized - 2007	0	0	0.3	n.a. / 135.5
Room_4781 wtrprk	AutoSized - 2013	0	0	0.3	n.a. / 135.9
Room_4782 wtrprk PL	AutoSized - 14919	0	0	0.3	n.a. / 1007.0
Room_3002 retail 18	AutoSized - 217	0	0	0.3	n.a. / 14.6
Room_3001 retail 18	AutoSized - 3718	0	0	0.3	n.a. / 251.0
Room_3000 Retail 18	AutoSized - 3826	0	0	0.3	n.a. / 258.3
Room_8000 mech	AutoSized - 1917	0	0	0.3	n.a. / 129.4
Room_8001 mech	AutoSized - 1144	0	0	0.3	n.a. / 77.2
Room_8002 mech	AutoSized - 1039	0	0	0.3	n.a. / 70.2
Room_8003 mech	AutoSized - 18273	0	0	0.3	n.a. / 1233.4
Room_8004 mech	AutoSized - 3471	0	0	0.3	n.a. / 234.3
Room_8005 mech 14	AutoSized - 537	0	0	0.3	n.a. / 36.2
Room_1000 corr 45-46	AutoSized - 26020	0	0	0.3	n.a. / 1756.4
Room_1002 circ 44	AutoSized - 889	0	0	0.3	n.a. / 60.0
Room_1004 circ 44	AutoSized - 4955	0	0	0.3	n.a. / 334.5
Room_1005 circ 44	AutoSized - 8888	0	0	0.3	n.a. / 599.9
Room_1006 circ 44	AutoSized - 2610	0	0	0.3	n.a. / 176.2
Room_1007 warehouse 4	AutoSized - 20160	0	0	0.3	n.a. / 1360.8
Room_1008 banquet 36	AutoSized - 4183	0	0	0.3	n.a. / 282.4
Room_1009 lobby 15	AutoSized - 9942	0	0	0.3	n.a. / 671.1
Room_1010 corr 37	AutoSized - 6754	0	0	0.3	n.a. / 455.9

Alternative A: Base Case

Room_1018 BOH 40	AutoSized - 2175	0	0	0.3	n.a. / 146.8
Room_0121 htl	AutoSized - 1077	0	0	1	n.a.
Room_0122 htl	AutoSized - 5532	0	0	1	n.a.
Room_0123 htl	AutoSized - 5164	0	0	1	n.a.
Room_0124 htl	AutoSized - 602	0	0	1	n.a.
Room_0126 htl	AutoSized - 5700	0	0	1	n.a.
Room_0127 htl	AutoSized - 5630	0	0	1	n.a.
Room_0128 htl	AutoSized - 5118	0	0	1	n.a.
Room_0129 htl	AutoSized - 1291	0	0	1	n.a.
Room_0130 htl	AutoSized - 602	0	0	1	n.a.
Room_0135 htl ph4	AutoSized - 5710	0	0	1	n.a.
Room_0136 htl ph4	AutoSized - 1111	0	0	1	n.a.
Room_0137 htl ph4	AutoSized - 5685	0	0	1	n.a.
Room_0138 htl ph4	AutoSized - 5285	0	0	1	n.a.
Room_0139 htl ph4	AutoSized - 1369	0	0	1	n.a.
Room_1014 meeting 40	AutoSized - 18180	0	0	0.3	n.a. / 1227.2
Room_1003 meeting 41-43	AutoSized - 33701	0	0	0.3	n.a. / 2274.9
Kitchen MAU	AutoSized - 50000	0	0	1	n.a. / 3375.0

Outside Air

Name	Total Flow (cfm)	Flow(cfm)/Person	Air change/hour	Fraction Supply Air
Room_0120 htl	n.a.	11	n.a.	n.a.
Room_6005 toilet 17	n.a.	17	n.a.	n.a.
Room_7000 office 17	n.a.	17	n.a.	n.a.
Room_7001 office 8	n.a.	17	n.a.	n.a.
Room_7002 office 8	n.a.	17	n.a.	n.a.
Room_7003 office 6	n.a.	17	n.a.	n.a.
Room_7004 office 5	n.a.	17	n.a.	n.a.
Room_7005 office 5	n.a.	17	n.a.	n.a.
Room_7006 office 6	n.a.	17	n.a.	n.a.
Room_7007 office 5	n.a.	17	n.a.	n.a.
Room_7008 office 6	n.a.	17	n.a.	n.a.
Room_7009 office 5	n.a.	17	n.a.	n.a.
Room_7011 corr 14	n.a.	17	n.a.	n.a.
Room_7013 office 18	n.a.	17	n.a.	n.a.
Room_7012 locker 7	n.a.	17	n.a.	n.a.
Room_7014 office 1	n.a.	17	n.a.	n.a.
Room_7015 office 2	n.a.	17	n.a.	n.a.
Room_7016 storage	n.a.	17	n.a.	n.a.
Room_7017 office 2	n.a.	17	n.a.	n.a.
Room_7018 Office 52	n.a.	17	n.a.	n.a.
Room_7019 office 52	n.a.	17	n.a.	n.a.
Room_7020 office 52	n.a.	17	n.a.	n.a.
Room_7021 office 52	n.a.	17	n.a.	n.a.
Room_7022 office 14	n.a.	17	n.a.	n.a.
Room_7023 office 51	n.a.	17	n.a.	n.a.
Room_9001 uncond	unconditioned	15	n.a.	n.a.
Room_9002 ph1 garage PL	unconditioned	15	n.a.	n.a.
Room_9003 garage 2	unconditioned	15	n.a.	n.a.
Room_9004 ph2 garage	unconditioned	15	n.a.	n.a.
Room_9005 loading	unconditioned	15	n.a.	n.a.
Room_7050 47	n.a.	17	n.a.	n.a.
Room_7051 53-54	n.a.	17	n.a.	n.a.
Room_7052 53-54	n.a.	17	n.a.	n.a.
Room_7053 55	n.a.	17	n.a.	n.a.
Room_7054 56	n.a.	17	n.a.	n.a.
Room_7055 53-54	n.a.	17	n.a.	n.a.
Room_7056 53-54	n.a.	17	n.a.	n.a.

Alternative A: Mitigated Case

Room_1011 corr 37	AutoSized - 4840	0	0	0.3	n.a. / 326.7
Room_1012 circ 19	AutoSized - 10444	0	0	0.3	n.a. / 705.0
Room_1013 circ 39	AutoSized - 8126	0	0	0.3	n.a. / 548.5
Room_1015 BOH 3	AutoSized - 10106	0	0	0.3	n.a. / 682.2
Room_1016 warehouse	AutoSized - 16960	0	0	0.3	n.a. / 1144.8
Room_1017 BOH 40	AutoSized - 2538	0	0	0.3	n.a. / 171.3
Room_1018 BOH 40	AutoSized - 2079	0	0	0.3	n.a. / 140.3
Room_0121 htl	AutoSized - 928	0	0	1	37.7 / 47.0
Room_0122 htl	AutoSized - 5010	0	0	1	201.4 / 249.8
Room_0123 htl	AutoSized - 4268	0	0	1	173.1 / 215.7
Room_0124 htl	AutoSized - 562	0	0	1	23.6 / 30.2
Room_0126 htl	AutoSized - 5375	0	0	1	225.8 / 289.7
Room_0127 htl	AutoSized - 5449	0	0	1	218.8 / 270.0
Room_0128 htl	AutoSized - 4983	0	0	1	200.8 / 248.5
Room_0129 htl	AutoSized - 1255	0	0	1	50.2 / 62.0
Room_0130 htl	AutoSized - 562	0	0	1	23.6 / 30.2
Room_0135 htl ph4	AutoSized - 5385	0	0	1	226.2 / 290.2
Room_0136 htl ph4	AutoSized - 1070	0	0	1	43.2 / 53.5
Room_0137 htl ph4	AutoSized - 5577	0	0	1	223.7 / 275.9
Room_0138 htl ph4	AutoSized - 5161	0	0	1	207.6 / 256.7
Room_0139 htl ph4	AutoSized - 1334	0	0	1	53.2 / 65.6
Room_1003 meeting 41-43	AutoSized - 33701	0	0	0.3	n.a. / 2274.9
Room_1014 meeting 40	AutoSized - 18180	0	0	0.3	n.a. / 1227.2
Kitchen MAU	AutoSized - 50000	0	0	1	n.a. / 3375.0

Outside Air

Name	Total Flow (cfm)	Flow(cfm)/Person	Air change/hour	Fraction Supply Air
Room_0120 htl	n.a.	11	n.a.	n.a.
Room_6005 toilet 17	n.a.	17	n.a.	n.a.
Room_7000 office 17	n.a.	17	n.a.	n.a.
Room_7001 office 8	n.a.	17	n.a.	n.a.
Room_7002 office 8	n.a.	17	n.a.	n.a.
Room_7003 office 6	n.a.	17	n.a.	n.a.
Room_7004 office 5	n.a.	17	n.a.	n.a.
Room_7005 office 5	n.a.	17	n.a.	n.a.
Room_7006 office 6	n.a.	17	n.a.	n.a.
Room_7007 office 5	n.a.	17	n.a.	n.a.
Room_7008 office 6	n.a.	17	n.a.	n.a.
Room_7009 office 5	n.a.	17	n.a.	n.a.
Room_7011 corr 14	n.a.	17	n.a.	n.a.
Room_7013 office 18	n.a.	17	n.a.	n.a.
Room_7012 locker 7	n.a.	17	n.a.	n.a.
Room_7014 office 1	n.a.	17	n.a.	n.a.
Room_7015 office 2	n.a.	17	n.a.	n.a.
Room_7016 storage	n.a.	17	n.a.	n.a.
Room_7017 office 2	n.a.	17	n.a.	n.a.
Room_7018 Office 52	n.a.	17	n.a.	n.a.
Room_7019 office 52	n.a.	17	n.a.	n.a.
Room_7020 office 52	n.a.	17	n.a.	n.a.
Room_7021 office 52	n.a.	17	n.a.	n.a.
Room_7022 office 14	n.a.	17	n.a.	n.a.
Room_7023 office 51	n.a.	17	n.a.	n.a.
Room_8006 BOH 36 PL	n.a.	17	n.a.	n.a.

Alternative A: Base Case

Room_7057 53-54	n.a.	17	n.a.	n.a.
Room_7058 56	n.a.	17	n.a.	n.a.
Room_7059 56	n.a.	17	n.a.	n.a.
Room_7060 53-54	n.a.	17	n.a.	n.a.
Room_7061 53-54	n.a.	17	n.a.	n.a.
Room_7062 57	n.a.	17	n.a.	n.a.
Room_7063 57	n.a.	17	n.a.	n.a.
Room_7064 58	n.a.	17	n.a.	n.a.
Room_7065 58	n.a.	17	n.a.	n.a.
Room_7066 58	n.a.	17	n.a.	n.a.
Room_7067 57	n.a.	17	n.a.	n.a.
Room_7068 58	n.a.	17	n.a.	n.a.
Room_8015 BOH 50	n.a.	17	n.a.	n.a.
Room_8014 BOH 50	n.a.	17	n.a.	n.a.
Room_8013 BOH 50	n.a.	17	n.a.	n.a.
Room_8012 BOH 50	n.a.	17	n.a.	n.a.
Room_8011 BOH 50	n.a.	17	n.a.	n.a.
Room_8010 BOH 40	n.a.	17	n.a.	n.a.
Room_8009 BOH 32	n.a.	17	n.a.	n.a.
Room_8008 BOH 32	n.a.	17	n.a.	n.a.
Room_8007 BOH 32	n.a.	17	n.a.	n.a.
Room_8006 BOH 36	n.a.	17	n.a.	n.a.
Room_6000 casino slots	n.a.	9	n.a.	n.a.
Room_6004 casino cs	n.a.	10	n.a.	n.a.
Room_6001 casino	n.a.	9	n.a.	n.a.
Room_6002 casino	n.a.	9	n.a.	n.a.
Room_6003 casino	n.a.	9	n.a.	n.a.
Room_5021 bar 31	n.a.	15	n.a.	n.a.
Room_5020 restaurant 48	n.a.	10	n.a.	n.a.
Room_5019 restaurant 48	n.a.	10	n.a.	n.a.
Room_5018 restaurant 48	n.a.	10	n.a.	n.a.
Room_5017 restaurant 48	n.a.	10	n.a.	n.a.
Room_5016 kitchen 49	n.a.	10	n.a.	n.a.
Room_5015 coffee 38	n.a.	10	n.a.	n.a.
Room_5014 lounge 31	n.a.	10	n.a.	n.a.
Room_5013 lounge 31	n.a.	10	n.a.	n.a.
Room_5012 kitchen 34	n.a.	10	n.a.	n.a.
Room_5011 dining 35	n.a.	10	n.a.	n.a.
Room_5010 dining 33	n.a.	10	n.a.	n.a.
Room_5009 dining 33	n.a.	10	n.a.	n.a.
Room_5008 food court 13	n.a.	10	n.a.	n.a.
Room_5007 buffet 10	n.a.	10	n.a.	n.a.
Room_5006 dining 9	n.a.	10	n.a.	n.a.
Room_5005 kitchen 11	n.a.	10	n.a.	n.a.
Room_5004 kitchen 11	n.a.	10	n.a.	n.a.
Room_5003 kitchen 11 PL2	n.a.	10	n.a.	n.a.
Room_5002 kitchen 12 PL	n.a.	10	n.a.	n.a.
Room_5001 rest 9	n.a.	10	n.a.	n.a.
Room_5000 bar 16	n.a.	10	n.a.	n.a.
Room_4778 wtrprk	n.a.	10	n.a.	n.a.
Room_4779 wtrprk	n.a.	10	n.a.	n.a.
Room_4780 wtrprk	n.a.	10	n.a.	n.a.
Room_4781 wtrprk	n.a.	10	n.a.	n.a.
Room_4782 wtrprk PL	n.a.	10	n.a.	n.a.
Room_3002 retail 18	n.a.	15	n.a.	n.a.
Room_3001 retail 18	n.a.	15	n.a.	n.a.

Alternative A: Mitigated Case

Room_8007 BOH 32	n.a.	17	n.a.	n.a.
Room_8008 BOH 32	n.a.	17	n.a.	n.a.
Room_8009 BOH 32	n.a.	17	n.a.	n.a.
Room_8010 BOH 40	n.a.	17	n.a.	n.a.
Room_8011 BOH 50	n.a.	17	n.a.	n.a.
Room_8012 BOH 50	n.a.	17	n.a.	n.a.
Room_8013 BOH 50	n.a.	17	n.a.	n.a.
Room_8014 BOH 50	n.a.	17	n.a.	n.a.
Room_8015 BOH 50	n.a.	17	n.a.	n.a.
Room_9001 uncond	unconditioned	15	n.a.	n.a.
Room_9002 ph1 garage PL	unconditioned	15	n.a.	n.a.
Room_9003 garage 2	unconditioned	15	n.a.	n.a.
Room_9004 ph2 garage	unconditioned	15	n.a.	n.a.
Room_9005 loading	unconditioned	15	n.a.	n.a.
Room_7067 47	n.a.	17	n.a.	n.a.
Room_7068 53-54	n.a.	17	n.a.	n.a.
Room_7050 53-54	n.a.	17	n.a.	n.a.
Room_7051 55	n.a.	17	n.a.	n.a.
Room_7052 56	n.a.	17	n.a.	n.a.
Room_7053 53-54	n.a.	17	n.a.	n.a.
Room_7054 53-54	n.a.	17	n.a.	n.a.
Room_7055 53-54	n.a.	17	n.a.	n.a.
Room_7056 53-54	n.a.	17	n.a.	n.a.
Room_7057 56	n.a.	17	n.a.	n.a.
Room_7058 53-54	n.a.	17	n.a.	n.a.
Room_7059 53-54	n.a.	17	n.a.	n.a.
Room_7060 57	n.a.	17	n.a.	n.a.
Room_7061 57	n.a.	17	n.a.	n.a.
Room_7062 58	n.a.	17	n.a.	n.a.
Room_7063 58	n.a.	17	n.a.	n.a.
Room_7064 58	n.a.	17	n.a.	n.a.
Room_7065 57	n.a.	17	n.a.	n.a.
Room_7066 58	n.a.	17	n.a.	n.a.
Room_6000 casino slots	n.a.	9	n.a.	n.a.
Room_6004 casino cs	n.a.	10	n.a.	n.a.
Room_6001 casino	n.a.	9	n.a.	n.a.
Room_6002 casino	n.a.	9	n.a.	n.a.
Room_6003 casino	n.a.	9	n.a.	n.a.
Room_5021 bar 31	n.a.	10	n.a.	n.a.
Room_5020 restaurant 48	n.a.	10	n.a.	n.a.
Room_5019 restaurant 48	n.a.	10	n.a.	n.a.
Room_5018 restaurant 48	n.a.	10	n.a.	n.a.
Room_5017 restaurant 48	n.a.	10	n.a.	n.a.
Room_5016 kitchen 49	n.a.	10	n.a.	n.a.
Room_5015 coffee 38	n.a.	10	n.a.	n.a.
Room_5014 lounge 31	n.a.	10	n.a.	n.a.
Room_5013 lounge 31	n.a.	10	n.a.	n.a.
Room_5012 kitchen 34	n.a.	10	n.a.	n.a.
Room_5011 dining 35	n.a.	10	n.a.	n.a.
Room_5010 dining 33	n.a.	10	n.a.	n.a.
Room_5009 dining 33	n.a.	10	n.a.	n.a.
Room_5008 food court 13	n.a.	10	n.a.	n.a.
Room_5007 buffet 10	n.a.	10	n.a.	n.a.
Room_5006 dining 9	n.a.	10	n.a.	n.a.
Room_5005 kitchen 11	n.a.	10	n.a.	n.a.
Room_5004 kitchen 11	n.a.	10	n.a.	n.a.

Alternative A: Base Case

Room_3000 Retail 18	n.a.	15	n.a.	n.a.
Room_8000 mech	n.a.	15	n.a.	n.a.
Room_8001 mech	n.a.	15	n.a.	n.a.
Room_8002 mech	n.a.	15	n.a.	n.a.
Room_8003 mech	n.a.	15	n.a.	n.a.
Room_8004 mech	n.a.	15	n.a.	n.a.
Room_8005 mech 14	n.a.	15	n.a.	n.a.
Room_1000 corr 45-46	n.a.	17	n.a.	n.a.
Room_1002 circ 44	n.a.	17	n.a.	n.a.
Room_1004 circ 44	n.a.	17	n.a.	n.a.
Room_1005 circ 44	n.a.	17	n.a.	n.a.
Room_1006 circ 44	n.a.	17	n.a.	n.a.
Room_1007 warehouse 4	n.a.	17	n.a.	n.a.
Room_1008 banquet 36	n.a.	17	n.a.	n.a.
Room_1009 lobby 15	n.a.	17	n.a.	n.a.
Room_1010 corr 37	n.a.	17	n.a.	n.a.
Room_1011 corr 37	n.a.	17	n.a.	n.a.
Room_1012 circ 19	n.a.	17	n.a.	n.a.
Room_1013 circ 39	n.a.	17	n.a.	n.a.
Room_1015 BOH 3	n.a.	17	n.a.	n.a.
Room_1016 warehouse	n.a.	17	n.a.	n.a.
Room_1017 BOH 40	n.a.	17	n.a.	n.a.
Room_1018 BOH 40	n.a.	17	n.a.	n.a.
Room_0121 htl	n.a.	11	n.a.	n.a.
Room_0122 htl	n.a.	11	n.a.	n.a.
Room_0123 htl	n.a.	11	n.a.	n.a.
Room_0124 htl	n.a.	11	n.a.	n.a.
Room_0126 htl	n.a.	11	n.a.	n.a.
Room_0127 htl	n.a.	11	n.a.	n.a.
Room_0128 htl	n.a.	11	n.a.	n.a.
Room_0129 htl	n.a.	11	n.a.	n.a.
Room_0130 htl	n.a.	11	n.a.	n.a.
Room_0135 htl ph4	n.a.	11	n.a.	n.a.
Room_0136 htl ph4	n.a.	11	n.a.	n.a.
Room_0137 htl ph4	n.a.	11	n.a.	n.a.
Room_0138 htl ph4	n.a.	11	n.a.	n.a.
Room_0139 htl ph4	n.a.	11	n.a.	n.a.
Room_1014 meeting 40	n.a.	17	n.a.	n.a.
Room_1003 meeting 41-43	n.a.	17	n.a.	n.a.
Kitchen MAU	50000	n.a.	n.a.	n.a.

Zone Thermostat and Terminal Box

	Thermostat		PIU		
Name	Type	Throttling Range (°F)	Type	Zone Fan Volume (cfm)	Fan Power (W)
Room_0120 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_6005 toilet 17	Reverse Action	4	No PIU	n.a.	n.a.
Room_7000 office 17	Reverse Action	4	No PIU	n.a.	n.a.
Room_7001 office 8	Reverse Action	4	No PIU	n.a.	n.a.
Room_7002 office 8	Reverse Action	4	No PIU	n.a.	n.a.
Room_7003 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7004 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7005 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7006 office 6	Reverse Action	4	No PIU	n.a.	n.a.

Alternative A: Mitigated Case

Room_5003 kitchen 11 PL2	n.a.	10	n.a.	n.a.
Room_5002 kitchen 12 PL	n.a.	10	n.a.	n.a.
Room_5001 rest 9	n.a.	10	n.a.	n.a.
Room_5000 bar 16	n.a.	10	n.a.	n.a.
Room_4778 wtrprk	n.a.	10	n.a.	n.a.
Room_4779 wtrprk	n.a.	10	n.a.	n.a.
Room_4780 wtrprk	n.a.	10	n.a.	n.a.
Room_4781 wtrprk	n.a.	10	n.a.	n.a.
Room_4782 wtrprk PL	n.a.	10	n.a.	n.a.
Room_3002 retail 18	n.a.	15	n.a.	n.a.
Room_3001 retail 18	n.a.	15	n.a.	n.a.
Room_3000 Retail 18	n.a.	15	n.a.	n.a.
Room_8000 mech	n.a.	17	n.a.	n.a.
Room_8001 mech	n.a.	15	n.a.	n.a.
Room_8002 mech	n.a.	15	n.a.	n.a.
Room_8003 mech	n.a.	15	n.a.	n.a.
Room_8004 mech	n.a.	15	n.a.	n.a.
Room_8005 mech 14	n.a.	15	n.a.	n.a.
Room_1000 corr 45-46	n.a.	17	n.a.	n.a.
Room_1002 circ 44	n.a.	17	n.a.	n.a.
Room_1004 circ 44	n.a.	17	n.a.	n.a.
Room_1005 circ 44	n.a.	17	n.a.	n.a.
Room_1006 circ 44	n.a.	17	n.a.	n.a.
Room_1007 warehouse 4	n.a.	17	n.a.	n.a.
Room_1008 banquet 36	n.a.	17	n.a.	n.a.
Room_1009 lobby 15	n.a.	17	n.a.	n.a.
Room_1010 corr 37	n.a.	17	n.a.	n.a.
Room_1011 corr 37	n.a.	17	n.a.	n.a.
Room_1012 circ 19	n.a.	17	n.a.	n.a.
Room_1013 circ 39	n.a.	17	n.a.	n.a.
Room_1015 BOH 3	n.a.	17	n.a.	n.a.
Room_1016 warehouse	n.a.	17	n.a.	n.a.
Room_1017 BOH 40	n.a.	17	n.a.	n.a.
Room_1018 BOH 40	n.a.	17	n.a.	n.a.
Room_0121 htl	n.a.	11	n.a.	n.a.
Room_0122 htl	n.a.	11	n.a.	n.a.
Room_0123 htl	n.a.	11	n.a.	n.a.
Room_0124 htl	n.a.	11	n.a.	n.a.
Room_0126 htl	n.a.	11	n.a.	n.a.
Room_0127 htl	n.a.	11	n.a.	n.a.
Room_0128 htl	n.a.	11	n.a.	n.a.
Room_0129 htl	n.a.	11	n.a.	n.a.
Room_0130 htl	n.a.	11	n.a.	n.a.
Room_0135 htl ph4	n.a.	11	n.a.	n.a.
Room_0136 htl ph4	n.a.	11	n.a.	n.a.
Room_0137 htl ph4	n.a.	11	n.a.	n.a.
Room_0138 htl ph4	n.a.	11	n.a.	n.a.
Room_0139 htl ph4	n.a.	11	n.a.	n.a.
Room_1003 meeting 41-43	n.a.	17	n.a.	n.a.
Room_1014 meeting 40	n.a.	17	n.a.	n.a.
Kitchen MAU	50000	n.a.	n.a.	n.a.

Zone Thermostat and Terminal Box

	Thermostat		PIU		
Name	Type	Throttling Range (°F)	Type	Zone Fan Volume (cfm)	Fan Power (W)
Room_0120 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_6005 toilet 17	Reverse Action	4	No PIU	n.a.	n.a.

Alternative A: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_7007 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7008 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7009 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7011 corr 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_7013 office 18	Reverse Action	4	No PIU	n.a.	n.a.
Room_7012 locker 7	Reverse Action	4	No PIU	n.a.	n.a.
Room_7014 office 1	Reverse Action	4	No PIU	n.a.	n.a.
Room_7015 office 2	Reverse Action	4	No PIU	n.a.	n.a.
Room_7016 storage	Reverse Action	4	No PIU	n.a.	n.a.
Room_7017 office 2	Reverse Action	4	No PIU	n.a.	n.a.
Room_7018 Office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7019 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7020 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7021 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7022 office 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_7023 office 51	Reverse Action	4	No PIU	n.a.	n.a.
Room_7050 47	Reverse Action	3	No PIU	n.a.	n.a.
Room_7051 53-54	Reverse Action	3	No PIU	n.a.	n.a.
Room_7052 53-54	Reverse Action	3	No PIU	n.a.	n.a.
Room_7053 55	Reverse Action	3	No PIU	n.a.	n.a.
Room_7054 56	Reverse Action	3	No PIU	n.a.	n.a.
Room_7055 53-54	Reverse Action	3	No PIU	n.a.	n.a.
Room_7056 53-54	Reverse Action	3	No PIU	n.a.	n.a.
Room_7057 53-54	Reverse Action	3	No PIU	n.a.	n.a.
Room_7058 56	Reverse Action	3	No PIU	n.a.	n.a.
Room_7059 56	Reverse Action	3	No PIU	n.a.	n.a.
Room_7060 53-54	Reverse Action	3	No PIU	n.a.	n.a.
Room_7061 53-54	Reverse Action	3	No PIU	n.a.	n.a.
Room_7062 57	Reverse Action	3	No PIU	n.a.	n.a.
Room_7063 57	Reverse Action	3	No PIU	n.a.	n.a.
Room_7064 58	Reverse Action	3	No PIU	n.a.	n.a.
Room_7065 58	Reverse Action	3	No PIU	n.a.	n.a.
Room_7066 58	Reverse Action	3	No PIU	n.a.	n.a.
Room_7067 57	Reverse Action	3	No PIU	n.a.	n.a.
Room_7068 58	Reverse Action	3	No PIU	n.a.	n.a.
Room_8015 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8014 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8013 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8012 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8011 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.

Alternative A: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_7000 office 17	Reverse Action	4	No PIU	n.a.	n.a.
Room_7001 office 8	Reverse Action	4	No PIU	n.a.	n.a.
Room_7002 office 8	Reverse Action	4	No PIU	n.a.	n.a.
Room_7003 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7004 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7005 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7006 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7007 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7008 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7009 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7011 corr 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_7013 office 18	Reverse Action	4	No PIU	n.a.	n.a.
Room_7012 locker 7	Reverse Action	4	No PIU	n.a.	n.a.
Room_7014 office 1	Reverse Action	4	No PIU	n.a.	n.a.
Room_7015 office 2	Reverse Action	4	No PIU	n.a.	n.a.
Room_7016 storage	Reverse Action	4	No PIU	n.a.	n.a.
Room_7017 office 2	Reverse Action	4	No PIU	n.a.	n.a.
Room_7018 Office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7019 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7020 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7021 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7022 office 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_7023 office 51	Reverse Action	4	No PIU	n.a.	n.a.
Room_8006 BOH 36 PL	Reverse Action	4	No PIU	n.a.	n.a.
Room_8007 BOH 32	Reverse Action	4	No PIU	n.a.	n.a.
Room_8008 BOH 32	Reverse Action	4	No PIU	n.a.	n.a.
Room_8009 BOH 32	Reverse Action	4	No PIU	n.a.	n.a.
Room_8010 BOH 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_8011 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8012 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8013 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8014 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8015 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_7067 47	Reverse Action	4	No PIU	n.a.	n.a.

Alternative A: Base Case

Room_8010 BOH 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_8009 BOH 32	Reverse Action	4	No PIU	n.a.	n.a.
Room_8008 BOH 32	Reverse Action	4	No PIU	n.a.	n.a.
Room_8007 BOH 32	Reverse Action	4	No PIU	n.a.	n.a.
Room_8006 BOH 36	Reverse Action	4	No PIU	n.a.	n.a.
Room_6000 casino slots	Reverse Action	4	No PIU	n.a.	n.a.
Room_6004 casino cs	Reverse Action	4	No PIU	n.a.	n.a.
Room_6001 casino	Reverse Action	4	No PIU	n.a.	n.a.
Room_6002 casino	Reverse Action	4	No PIU	n.a.	n.a.
Room_6003 casino	Reverse Action	4	No PIU	n.a.	n.a.
Room_5021 bar 31	Reverse Action	4	No PIU	n.a.	n.a.
Room_5020 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5019 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5018 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5017 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5016 kitchen 49	Reverse Action	4	No PIU	n.a.	n.a.
Room_5015 coffee 38	Reverse Action	4	No PIU	n.a.	n.a.
Room_5014 lounge 31	Reverse Action	4	No PIU	n.a.	n.a.
Room_5013 lounge 31	Reverse Action	4	No PIU	n.a.	n.a.
Room_5012 kitchen 34	Reverse Action	4	No PIU	n.a.	n.a.
Room_5011 dining 35	Reverse Action	4	No PIU	n.a.	n.a.
Room_5010 dining 33	Reverse Action	4	No PIU	n.a.	n.a.
Room_5009 dining 33	Reverse Action	4	No PIU	n.a.	n.a.
Room_5008 food court 13	Reverse Action	4	No PIU	n.a.	n.a.
Room_5007 buffet 10	Reverse Action	4	No PIU	n.a.	n.a.
Room_5006 dining 9	Reverse Action	4	No PIU	n.a.	n.a.
Room_5005 kitchen 11	Reverse Action	4	No PIU	n.a.	n.a.
Room_5004 kitchen 11	Reverse Action	4	No PIU	n.a.	n.a.
Room_5003 kitchen 11 PL2	Reverse Action	4	No PIU	n.a.	n.a.
Room_5002 kitchen 12 PL	Reverse Action	4	No PIU	n.a.	n.a.
Room_5001 rest 9	Reverse Action	4	No PIU	n.a.	n.a.
Room_5000 bar 16	Reverse Action	4	No PIU	n.a.	n.a.
Room_4778 wtrprk	Reverse Action	4	No PIU	n.a.	n.a.
Room_4779 wtrprk	Reverse Action	4	No PIU	n.a.	n.a.

Alternative A: Mitigated Case

Room_7068 53-54	Reverse Action	4	No PIU	n.a.	n.a.
Room_7050 53-54	Reverse Action	4	No PIU	n.a.	n.a.
Room_7051 55	Reverse Action	4	No PIU	n.a.	n.a.
Room_7052 56	Reverse Action	4	No PIU	n.a.	n.a.
Room_7053 53-54	Reverse Action	4	No PIU	n.a.	n.a.
Room_7054 53-54	Reverse Action	4	No PIU	n.a.	n.a.
Room_7055 53-54	Reverse Action	4	No PIU	n.a.	n.a.
Room_7056 53-54	Reverse Action	4	No PIU	n.a.	n.a.
Room_7057 56	Reverse Action	4	No PIU	n.a.	n.a.
Room_7058 53-54	Reverse Action	4	No PIU	n.a.	n.a.
Room_7059 53-54	Reverse Action	4	No PIU	n.a.	n.a.
Room_7060 57	Reverse Action	4	No PIU	n.a.	n.a.
Room_7061 57	Reverse Action	4	No PIU	n.a.	n.a.
Room_7062 58	Reverse Action	4	No PIU	n.a.	n.a.
Room_7063 58	Reverse Action	4	No PIU	n.a.	n.a.
Room_7064 58	Reverse Action	4	No PIU	n.a.	n.a.
Room_7065 57	Reverse Action	4	No PIU	n.a.	n.a.
Room_7066 58	Reverse Action	4	No PIU	n.a.	n.a.
Room_6000 casino slots	Reverse Action	4	No PIU	n.a.	n.a.
Room_6004 casino cs	Reverse Action	4	No PIU	n.a.	n.a.
Room_6001 casino	Reverse Action	4	No PIU	n.a.	n.a.
Room_6002 casino	Reverse Action	4	No PIU	n.a.	n.a.
Room_6003 casino	Reverse Action	4	No PIU	n.a.	n.a.
Room_5021 bar 31	Reverse Action	4	No PIU	n.a.	n.a.
Room_5020 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5019 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5018 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5017 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5016 kitchen 49	Reverse Action	4	No PIU	n.a.	n.a.
Room_5015 coffee 38	Reverse Action	4	No PIU	n.a.	n.a.
Room_5014 lounge 31	Reverse Action	4	No PIU	n.a.	n.a.
Room_5013 lounge 31	Reverse Action	4	No PIU	n.a.	n.a.
Room_5012 kitchen 34	Reverse Action	4	No PIU	n.a.	n.a.
Room_5011 dining 35	Reverse Action	4	No PIU	n.a.	n.a.
Room_5010 dining 33	Reverse Action	4	No PIU	n.a.	n.a.
Room_5009 dining 33	Reverse Action	4	No PIU	n.a.	n.a.
Room_5008 food court 13	Reverse Action	4	No PIU	n.a.	n.a.
Room_5007 buffet 10	Reverse Action	4	No PIU	n.a.	n.a.
Room_5006 dining 9	Reverse Action	4	No PIU	n.a.	n.a.

Alternative A: Base Case

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Room_4780 wtrprk	Reverse Action	4	No PIU	n.a.	n.a.
Room_4781 wtrprk	Reverse Action	4	No PIU	n.a.	n.a.
Room_4782 wtrprk PL	Reverse Action	4	No PIU	n.a.	n.a.
Room_3002 retail 18	Reverse Action	4	No PIU	n.a.	n.a.
Room_3001 retail 18	Reverse Action	4	No PIU	n.a.	n.a.
Room_3000 Retail 18	Reverse Action	4	No PIU	n.a.	n.a.
Room_8000 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8001 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8002 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8003 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8004 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8005 mech 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_1000 corr 45-46	Reverse Action	4	No PIU	n.a.	n.a.
Room_1002 circ 44	Reverse Action	4	No PIU	n.a.	n.a.
Room_1004 circ 44	Reverse Action	4	No PIU	n.a.	n.a.
Room_1005 circ 44	Reverse Action	4	No PIU	n.a.	n.a.
Room_1006 circ 44	Reverse Action	4	No PIU	n.a.	n.a.
Room_1007 warehouse 4	Reverse Action	4	No PIU	n.a.	n.a.
Room_1008 banquet 36	Reverse Action	4	No PIU	n.a.	n.a.
Room_1009 lobby 15	Reverse Action	4	No PIU	n.a.	n.a.
Room_1010 corr 37	Reverse Action	4	No PIU	n.a.	n.a.
Room_1011 corr 37	Reverse Action	4	No PIU	n.a.	n.a.
Room_1012 circ 19	Reverse Action	4	No PIU	n.a.	n.a.
Room_1013 circ 39	Reverse Action	4	No PIU	n.a.	n.a.
Room_1015 BOH 3	Reverse Action	4	No PIU	n.a.	n.a.
Room_1016 warehouse	Reverse Action	4	No PIU	n.a.	n.a.
Room_1017 BOH 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_1018 BOH 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_0121 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0122 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0123 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0124 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0126 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0127 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0128 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0129 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0130 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0135 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.

Alternative A: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_5005 kitchen 11	Reverse Action	4	No PIU	n.a.	n.a.
Room_5004 kitchen 11	Reverse Action	4	No PIU	n.a.	n.a.
Room_5003 kitchen 11 PL2	Reverse Action	4	No PIU	n.a.	n.a.
Room_5002 kitchen 12 PL	Reverse Action	4	No PIU	n.a.	n.a.
Room_5001 rest 9	Reverse Action	4	No PIU	n.a.	n.a.
Room_5000 bar 16	Reverse Action	4	No PIU	n.a.	n.a.
Room_4778 wtrprk	Reverse Action	4	No PIU	n.a.	n.a.
Room_4779 wtrprk	Reverse Action	4	No PIU	n.a.	n.a.
Room_4780 wtrprk	Reverse Action	4	No PIU	n.a.	n.a.
Room_4781 wtrprk	Reverse Action	4	No PIU	n.a.	n.a.
Room_4782 wtrprk PL	Reverse Action	4	No PIU	n.a.	n.a.
Room_3002 retail 18	Reverse Action	4	No PIU	n.a.	n.a.
Room_3001 retail 18	Reverse Action	4	No PIU	n.a.	n.a.
Room_3000 Retail 18	Reverse Action	4	No PIU	n.a.	n.a.
Room_8000 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8001 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8002 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8003 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8004 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8005 mech 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_1000 corr 45-46	Reverse Action	4	No PIU	n.a.	n.a.
Room_1002 circ 44	Reverse Action	4	No PIU	n.a.	n.a.
Room_1004 circ 44	Reverse Action	4	No PIU	n.a.	n.a.
Room_1005 circ 44	Reverse Action	4	No PIU	n.a.	n.a.
Room_1006 circ 44	Reverse Action	4	No PIU	n.a.	n.a.
Room_1007 warehouse 4	Reverse Action	4	No PIU	n.a.	n.a.
Room_1008 banquet 36	Reverse Action	4	No PIU	n.a.	n.a.
Room_1009 lobby 15	Reverse Action	4	No PIU	n.a.	n.a.
Room_1010 corr 37	Reverse Action	4	No PIU	n.a.	n.a.
Room_1011 corr 37	Reverse Action	4	No PIU	n.a.	n.a.
Room_1012 circ 19	Reverse Action	4	No PIU	n.a.	n.a.
Room_1013 circ 39	Reverse Action	4	No PIU	n.a.	n.a.
Room_1015 BOH 3	Reverse Action	4	No PIU	n.a.	n.a.
Room_1016 warehouse	Reverse Action	4	No PIU	n.a.	n.a.

Alternative A: Base Case

Room_0136 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_0137 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_0138 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_0139 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_1014 meeting 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_1003 meeting 41-43	Reverse Action	4	No PIU	n.a.	n.a.
Kitchen MAU	Reverse Action	4	No PIU	n.a.	n.a.

Zone Heating

	Zone Reheat		Baseboards	
Name	Reheat Delta-T (°F)	Heat Source	Rating (kBtu/hr)	Control
Room_6005 toilet 17	50	Hot Water from Plant	n.a.	n.a.
Room_7000 office 17	50	Hot Water from Plant	n.a.	n.a.
Room_7001 office 8	50	Hot Water from Plant	n.a.	n.a.
Room_7002 office 8	50	Hot Water from Plant	n.a.	n.a.
Room_7003 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7004 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7005 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7006 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7007 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7008 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7009 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7011 corr 14	50	Hot Water from Plant	n.a.	n.a.
Room_7013 office 18	50	Hot Water from Plant	n.a.	n.a.
Room_7012 locker 7	50	Hot Water from Plant	n.a.	n.a.
Room_7014 office 1	50	Hot Water from Plant	n.a.	n.a.
Room_7015 office 2	50	Hot Water from Plant	n.a.	n.a.
Room_7016 storage	50	Hot Water from Plant	n.a.	n.a.
Room_7017 office 2	50	Hot Water from Plant	n.a.	n.a.
Room_7018 Office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7019 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7020 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7021 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7022 office 14	50	Hot Water from Plant	n.a.	n.a.
Room_7023 office 51	50	Hot Water from Plant	n.a.	n.a.
Room_7050 47	50	Hot Water from Plant	n.a.	n.a.
Room_7051 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7052 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7053 55	50	Hot Water from Plant	n.a.	n.a.
Room_7054 56	50	Hot Water from Plant	n.a.	n.a.
Room_7055 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7056 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7057 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7058 56	50	Hot Water from Plant	n.a.	n.a.
Room_7059 56	50	Hot Water from Plant	n.a.	n.a.
Room_7060 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7061 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7062 57	50	Hot Water from Plant	n.a.	n.a.
Room_7063 57	50	Hot Water from Plant	n.a.	n.a.
Room_7064 58	50	Hot Water from Plant	n.a.	n.a.
Room_7065 58	50	Hot Water from Plant	n.a.	n.a.
Room_7066 58	50	Hot Water from Plant	n.a.	n.a.
Room_7067 57	50	Hot Water from Plant	n.a.	n.a.
Room_7068 58	50	Hot Water from Plant	n.a.	n.a.
Room_8015 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8014 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8013 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8012 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8011 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8010 BOH 40	50	Hot Water from Plant	n.a.	n.a.
Room_8009 BOH 32	50	Hot Water from Plant	n.a.	n.a.
Room_8008 BOH 32	50	Hot Water from Plant	n.a.	n.a.

Alternative A: Mitigated Case

Room_1017 BOH 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_1018 BOH 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_0121 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0122 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0123 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0124 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0126 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0127 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0128 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0129 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0130 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0135 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_0136 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_0137 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_0138 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_0139 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_1003 meeting 41-43	Reverse Action	4	No PIU	n.a.	n.a.
Room_1014 meeting 40	Reverse Action	4	No PIU	n.a.	n.a.
Kitchen MAU	Reverse Action	4	No PIU	n.a.	n.a.

Zone Heating

	Zone Reheat		Baseboards	
Name	Reheat Delta-T (°F)	Heat Source	Rating (kBtu/hr)	Control
Room_6005 toilet 17	50	Hot Water from Plant	n.a.	n.a.
Room_7000 office 17	50	Hot Water from Plant	n.a.	n.a.
Room_7001 office 8	50	Hot Water from Plant	n.a.	n.a.
Room_7002 office 8	50	Hot Water from Plant	n.a.	n.a.
Room_7003 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7004 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7005 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7006 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7007 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7008 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7009 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7011 corr 14	50	Hot Water from Plant	n.a.	n.a.
Room_7013 office 18	50	Hot Water from Plant	n.a.	n.a.
Room_7012 locker 7	50	Hot Water from Plant	n.a.	n.a.
Room_7014 office 1	50	Hot Water from Plant	n.a.	n.a.
Room_7015 office 2	50	Hot Water from Plant	n.a.	n.a.
Room_7016 storage	50	Hot Water from Plant	n.a.	n.a.
Room_7017 office 2	50	Hot Water from Plant	n.a.	n.a.
Room_7018 Office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7019 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7020 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7021 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7022 office 14	50	Hot Water from Plant	n.a.	n.a.
Room_7023 office 51	50	Hot Water from Plant	n.a.	n.a.
Room_8006 BOH 36 PL	50	Hot Water from Plant	n.a.	n.a.
Room_8007 BOH 32	50	Hot Water from Plant	n.a.	n.a.
Room_8008 BOH 32	50	Hot Water from Plant	n.a.	n.a.
Room_8009 BOH 32	50	Hot Water from Plant	n.a.	n.a.
Room_8010 BOH 40	50	Hot Water from Plant	n.a.	n.a.
Room_8011 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8012 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8013 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8014 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8015 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_7067 47	50	Hot Water from Plant	n.a.	n.a.

Alternative A: Base Case

Room_8007 BOH 32	50	Hot Water from Plant	n.a.	n.a.
Room_8006 BOH 36	50	Hot Water from Plant	n.a.	n.a.
Room_6000 casino slots	50	Hot Water from Plant	n.a.	n.a.
Room_6004 casino cs	50	Hot Water from Plant	n.a.	n.a.
Room_6001 casino	50	Hot Water from Plant	n.a.	n.a.
Room_6002 casino	50	Hot Water from Plant	n.a.	n.a.
Room_6003 casino	50	Hot Water from Plant	n.a.	n.a.
Room_5021 bar 31	50	Hot Water from Plant	n.a.	n.a.
Room_5020 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5019 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5018 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5017 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5016 kitchen 49	50	Hot Water from Plant	n.a.	n.a.
Room_5015 coffee 38	50	Hot Water from Plant	n.a.	n.a.
Room_5014 lounge 31	50	Hot Water from Plant	n.a.	n.a.
Room_5013 lounge 31	50	Hot Water from Plant	n.a.	n.a.
Room_5012 kitchen 34	50	Hot Water from Plant	n.a.	n.a.
Room_5011 dining 35	50	Hot Water from Plant	n.a.	n.a.
Room_5010 dining 33	50	Hot Water from Plant	n.a.	n.a.
Room_5009 dining 33	50	Hot Water from Plant	n.a.	n.a.
Room_5008 food court 13	50	Hot Water from Plant	n.a.	n.a.
Room_5007 buffet 10	50	Hot Water from Plant	n.a.	n.a.
Room_5006 dining 9	50	Hot Water from Plant	n.a.	n.a.
Room_5005 kitchen 11	50	Hot Water from Plant	n.a.	n.a.
Room_5004 kitchen 11	50	Hot Water from Plant	n.a.	n.a.
Room_5003 kitchen 11 PL2	50	Hot Water from Plant	n.a.	n.a.
Room_5002 kitchen 12 PL	50	Hot Water from Plant	n.a.	n.a.
Room_5001 rest 9	50	Hot Water from Plant	n.a.	n.a.
Room_5000 bar 16	50	Hot Water from Plant	n.a.	n.a.
Room_4778 wtrprk	50	Hot Water from Plant	n.a.	n.a.
Room_4779 wtrprk	50	Hot Water from Plant	n.a.	n.a.
Room_4780 wtrprk	50	Hot Water from Plant	n.a.	n.a.
Room_4781 wtrprk	50	Hot Water from Plant	n.a.	n.a.
Room_4782 wtrprk PL	50	Hot Water from Plant	n.a.	n.a.
Room_3002 retail 18	50	Hot Water from Plant	n.a.	n.a.
Room_3001 retail 18	50	Hot Water from Plant	n.a.	n.a.
Room_3000 Retail 18	50	Hot Water from Plant	n.a.	n.a.
Room_8000 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8001 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8002 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8003 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8004 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8005 mech 14	50	Hot Water from Plant	n.a.	n.a.
Room_1000 corr 45-46	50	Hot Water from Plant	n.a.	n.a.
Room_1002 circ 44	50	Hot Water from Plant	n.a.	n.a.
Room_1004 circ 44	50	Hot Water from Plant	n.a.	n.a.
Room_1005 circ 44	50	Hot Water from Plant	n.a.	n.a.
Room_1006 circ 44	50	Hot Water from Plant	n.a.	n.a.
Room_1007 warehouse 4	50	Hot Water from Plant	n.a.	n.a.
Room_1008 banquet 36	50	Hot Water from Plant	n.a.	n.a.
Room_1009 lobby 15	50	Hot Water from Plant	n.a.	n.a.
Room_1010 corr 37	50	Hot Water from Plant	n.a.	n.a.
Room_1011 corr 37	50	Hot Water from Plant	n.a.	n.a.

Alternative A: Mitigated Case

Room_7068 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7050 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7051 55	50	Hot Water from Plant	n.a.	n.a.
Room_7052 56	50	Hot Water from Plant	n.a.	n.a.
Room_7053 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7054 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7055 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7056 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7057 56	50	Hot Water from Plant	n.a.	n.a.
Room_7058 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7059 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7060 57	50	Hot Water from Plant	n.a.	n.a.
Room_7061 57	50	Hot Water from Plant	n.a.	n.a.
Room_7062 58	50	Hot Water from Plant	n.a.	n.a.
Room_7063 58	50	Hot Water from Plant	n.a.	n.a.
Room_7064 58	50	Hot Water from Plant	n.a.	n.a.
Room_7065 57	50	Hot Water from Plant	n.a.	n.a.
Room_7066 58	50	Hot Water from Plant	n.a.	n.a.
Room_6000 casino slots	50	Hot Water from Plant	n.a.	n.a.
Room_6004 casino cs	50	Hot Water from Plant	n.a.	n.a.
Room_6001 casino	50	Hot Water from Plant	n.a.	n.a.
Room_6002 casino	50	Hot Water from Plant	n.a.	n.a.
Room_6003 casino	50	Hot Water from Plant	n.a.	n.a.
Room_5021 bar 31	50	Hot Water from Plant	n.a.	n.a.
Room_5020 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5019 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5018 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5017 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5016 kitchen 49	50	Hot Water from Plant	n.a.	n.a.
Room_5015 coffee 38	50	Hot Water from Plant	n.a.	n.a.
Room_5014 lounge 31	50	Hot Water from Plant	n.a.	n.a.
Room_5013 lounge 31	50	Hot Water from Plant	n.a.	n.a.
Room_5012 kitchen 34	50	Hot Water from Plant	n.a.	n.a.
Room_5011 dining 35	50	Hot Water from Plant	n.a.	n.a.
Room_5010 dining 33	50	Hot Water from Plant	n.a.	n.a.
Room_5009 dining 33	50	Hot Water from Plant	n.a.	n.a.
Room_5008 food court 13	50	Hot Water from Plant	n.a.	n.a.
Room_5007 buffet 10	50	Hot Water from Plant	n.a.	n.a.
Room_5006 dining 9	50	Hot Water from Plant	n.a.	n.a.
Room_5005 kitchen 11	50	Hot Water from Plant	n.a.	n.a.
Room_5004 kitchen 11	50	Hot Water from Plant	n.a.	n.a.
Room_5003 kitchen 11 PL2	50	Hot Water from Plant	n.a.	n.a.
Room_5002 kitchen 12 PL	50	Hot Water from Plant	n.a.	n.a.
Room_5001 rest 9	50	Hot Water from Plant	n.a.	n.a.
Room_5000 bar 16	50	Hot Water from Plant	n.a.	n.a.
Room_4778 wtrprk	50	Hot Water from Plant	n.a.	n.a.
Room_4779 wtrprk	50	Hot Water from Plant	n.a.	n.a.
Room_4780 wtrprk	50	Hot Water from Plant	n.a.	n.a.
Room_4781 wtrprk	50	Hot Water from Plant	n.a.	n.a.
Room_4782 wtrprk PL	50	Hot Water from Plant	n.a.	n.a.
Room_3002 retail 18	50	Hot Water from Plant	n.a.	n.a.
Room_3001 retail 18	50	Hot Water from Plant	n.a.	n.a.
Room_3000 Retail 18	50	Hot Water from Plant	n.a.	n.a.
Room_8000 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8001 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8002 mech	50	Hot Water from Plant	n.a.	n.a.

Alternative A: Base Case

Room_1012 circ 19	50	Hot Water from Plant	n.a.	n.a.
Room_1013 circ 39	50	Hot Water from Plant	n.a.	n.a.
Room_1015 BOH 3	50	Hot Water from Plant	n.a.	n.a.
Room_1016 warehouse	50	Hot Water from Plant	n.a.	n.a.
Room_1017 BOH 40	50	Hot Water from Plant	n.a.	n.a.
Room_1018 BOH 40	50	Hot Water from Plant	n.a.	n.a.
Room_1014 meeting 40	50	Hot Water from Plant	n.a.	n.a.
Room_1003 meeting 41-43	50	Hot Water from Plant	n.a.	n.a.
Kitchen MAU	50	Hot Water from Plant	n.a.	n.a.

Alternative A: Mitigated Case

Room_8003 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8004 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8005 mech 14	50	Hot Water from Plant	n.a.	n.a.
Room_1000 corr 45-46	50	Hot Water from Plant	n.a.	n.a.
Room_1002 circ 44	50	Hot Water from Plant	n.a.	n.a.
Room_1004 circ 44	50	Hot Water from Plant	n.a.	n.a.
Room_1005 circ 44	50	Hot Water from Plant	n.a.	n.a.
Room_1006 circ 44	50	Hot Water from Plant	n.a.	n.a.
Room_1007 warehouse 4	50	Hot Water from Plant	n.a.	n.a.
Room_1008 banquet 36	50	Hot Water from Plant	n.a.	n.a.
Room_1009 lobby 15	50	Hot Water from Plant	n.a.	n.a.
Room_1010 corr 37	50	Hot Water from Plant	n.a.	n.a.
Room_1011 corr 37	50	Hot Water from Plant	n.a.	n.a.
Room_1012 circ 19	50	Hot Water from Plant	n.a.	n.a.
Room_1013 circ 39	50	Hot Water from Plant	n.a.	n.a.
Room_1015 BOH 3	50	Hot Water from Plant	n.a.	n.a.
Room_1016 warehouse	50	Hot Water from Plant	n.a.	n.a.
Room_1017 BOH 40	50	Hot Water from Plant	n.a.	n.a.
Room_1018 BOH 40	50	Hot Water from Plant	n.a.	n.a.
Room_1003 meeting 41-43	50	Hot Water from Plant	n.a.	n.a.
Room_1014 meeting 40	50	Hot Water from Plant	n.a.	n.a.
Kitchen MAU	50	Hot Water from Plant	n.a.	n.a.

Alternative A: Base Case

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt A Base Case
Case Description: Full build-out Phase 1A 1B 2 3 4

Chilled Water Temperature 44 °F

Chilled Water Pumps

Type	Variable-Speed
Head (ft)	75
Motor Efficiency	0.65
Impeller Efficiency	1

Hot Water Pump

Type	Variable-Speed
Head (ft)	60
Motor Efficiency	1
Impeller Efficiency	0.6

Cooling Tower (Central Plant)

Type	Open
Efficiency (bhp/tons)	0.017
Approach Temperature	8 °F
Design Wetbulb Temperature	78 °F
Design Range	10 °F
Cooling Cap (tons) AutoSized	4168.983
Waterside Economizer	No
Number of Cells	1
Cell Control	Minimum Needed
Temperature Control	Fixed
Setpoint Temperature	85 °F
Throttling Temperature	10 °F
Minimum Water Temperature	55 °F
Capacity Control	Two-Speed Fan
Minimum CFM Ratio	0.5
Minimum Power Ratio	0.16

Chiller Type #1: Centrifugal

Condenser Type	Water-cooled
Chiller Autosized	Yes
Hot Gas ByPass	No
Min. Operating Point	0.2144
Rated Efficiency	0.576 (kW/ton)
Rated CHWS	44 °F
Rated Condition CWS	85 °F
Evap. Flow	2.4 (gpm/ton)
Evap. Pressure Drop	0 (ft)
Evap. Imp. Eff.	1
Evap. Motor Eff.	1
Cond. Flow	2.78 (gpm/ton)
Cond. Pressure Drop	60 (ft)
Cond. Imp. Eff.	1
Cond. Motor Eff.	0.6
Number Installed	1
AutoSized	3392.432 (tons)

Alternative A: Mitigated Case

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt A Design Case
Case Description: Full build-out Phase 1A 1B 2 3 4

Chilled Water Temperature 42 °F

Chilled Water Pumps

Type	Variable-Speed
Head (ft)	75
Motor Efficiency	1
Impeller Efficiency	0.65

Hot Water Pump

Type	Variable-Speed
Head (ft)	60
Motor Efficiency	1
Impeller Efficiency	0.65

Cooling Tower (Central Plant)

Type	Open
Efficiency (bhp/tons)	0.013
Approach Temperature	8 °F
Design Wetbulb Temperature	78 °F
Design Range	15 °F
Cooling Cap (tons) AutoSized	4612.898
Waterside Economizer	No
Number of Cells	5
Cell Control	Minimum Needed
Temperature Control	Fixed
Setpoint Temperature	85 °F
Throttling Temperature	15 °F
Minimum Water Temperature	55 °F
Capacity Control	Variable Speed Fan
Minimum Fan Speed	0.5

Chiller Type #1: Centrifugal

Condenser Type	Water-cooled
Chiller Autosized	No
Hot Gas ByPass	No
Min. Operating Point	0.2144
Rated Efficiency	0.52 (kW/ton)
Rated CHWS	44 °F
Rated Condition CWS	85 °F
Evap. Flow	1.7 (gpm/ton)
Evap. Pressure Drop	0 (ft)
Evap. Imp. Eff.	1
Evap. Motor Eff.	1
Cond. Flow	2.75 (gpm/ton)
Cond. Pressure Drop	60 (ft)
Cond. Imp. Eff.	1
Cond. Motor Eff.	0.6
Number Installed	5
Size #1	800.0 (tons)
Size #2	800.0 (tons)
Size #3	800.0 (tons)
Size #4	800.0 (tons)
Size #5	800.0 (tons)

Alternative A: Base Case

Fuel Boiler Type #1: Fuel Hot Water w/ Atmospheric Burner

Boiler Autosized	Yes
Number Installed	1
Boiler Efficiency	0.8
Min. Operating Point	0.5
Max. Operating Point	1
AutoSized	29.961 MBtu/h

Alternative A: Mitigated Case

Fuel Boiler Type #1: Fuel Hot Water w/ Atmospheric Burner

Boiler Autosized	Yes
Number Installed	1
Boiler Efficiency	0.85
Min. Operating Point	0.5
Max. Operating Point	1
AutoSized	29.41 MBtu/h

Alternative A: Base Case

VisualDOE 4.1 - Systems Summary **April 3, 2014**

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt A Base Case
Case Description: Full build-out Phase 1A 1B 2 3 4
Number of Systems: 25

Systems Summary

Name	Type	Conditioned Area (ft²)	Supply Air (CFM)	Min. OA Ratio	Cooling Cap (kBtu/h)	Heating Cap (kBtu/h)	Cooling Peak (kBtu/h)	Heating Peak (kBtu/h)	Cooling Energy (MBtu)	Heating Energy (MBtu)
System_38073	PSZ	88200	68163	0.071	1978	3650.1	750.6	320.2	1665.1	184.8
AHU Office	VAVS	268675	263094	0.087	11706.5	0	5513.1	2028.9	11335.7	961.2
AHU Slots	VAVS	73898	245578	0.2	12518.9	0	10077.1	466.2	28457.1	2150.7
AHU Tables	VAVS	65980	235852	0.2	11936	0	9308.7	201.8	23605.1	136
AHU Restaurant	VAVS	92710	144897	0.472	7370.5	3251.7	6791.2	5007.8	8070.3	2395.9
AHU Water Park	PVAVS	25600	24220	0.211	952.8	0	715.6	429.6	866.8	131.9
AHU Retail	VAVS	8572	8259	0.052	358.6	0	507.4	521.5	284.5	684.2
FCU Mech	VAVS	32266	27672	0.064	1217.2	0	698.6	444.1	3415.6	864.7
AHU Assembly	VAVS	133591	144692	0.523	7201.3	4057.3	5762	9099.2	4836.9	4320.6
System_38082	PSZ	9000	12924	0.038	359.5	647	199	217	213.3	403.3
System_38083	PSZ	40578	66385	0.034	1822.5	3290.3	1041.9	809.2	1475.5	1107.7
System_38084	PSZ	40476	61964	0.036	1714.1	3086.3	1001.7	849.4	1095.4	1451.8
System_38085	PSZ	9010	7218	0.069	208.9	384.6	99.3	120	152.4	224.2
System_38086	PSZ	88202	68396	0.071	1984.2	3660.8	717.2	323.7	1554.9	220.9
System_38087	PSZ	40578	67558	0.033	1853.6	3344.3	1065.1	817.1	1458.7	1143.4
System_38088	PSZ	40476	61414	0.036	1699.5	3061.1	987.7	848.4	1084.6	1457
System_38089	PSZ	9010	15490	0.032	423.5	765.1	232.1	193.4	343.9	260.8
System_38090	PSZ	9000	7225	0.069	209	384.9	96.4	131.7	128.9	277.8
System_38091	PSZ	88200	68519	0.071	1987.5	3666.5	720.2	322.5	1530	227.8
System_38092	PSZ	9000	13330	0.037	370.3	665.6	211.6	218.3	220.5	401.9
System_38093	PSZ	40578	68225	0.033	1871.3	3375	1079.3	815.6	1489.5	1131.5
System_38094	PSZ	40476	63419	0.035	1752.7	3153.3	1042.8	847.7	1122	1443.4
System_38095	PSZ	9010	16424	0.03	448.3	808.1	254	194.1	377.7	254.8
AHU Meeting	VAVS	24415	51882	1	2613.3	4114.8	2405.1	3329	1711	1080.4
AHU MAU Ph1	RHFS	1	50000	1	2173.2	0	2946.3	3144	3928.5	8462.1

Systems Summary per Conditioned Area

Name	Type	Conditioned Area (ft²)	Supply Air (CFM/ft²)	Min. OA Ratio	Cooling Cap (Btu/h/ft²)	Heating Cap (Btu/h/ft²)	Cooling Peak (Btu/h/ft²)	Heating Peak (Btu/h/ft²)	Cooling Energy (kBtu/ft²)	Heating Energy (kBtu/ft²)
System_38073	PSZ	88200	0.773	0.071	22	41	9	4	18.9	2.1
AHU Office	VAVS	268675	0.979	0.087	44	0	21	8	42.2	3.6
AHU Slots	VAVS	73898	3.323	0.2	169	0	136	6	385.1	29.1
AHU Tables	VAVS	65980	3.575	0.2	181	0	141	3	357.8	2.1
AHU Restaurant	VAVS	92710	1.563	0.472	80	35	73	54	87	25.8
AHU Water Park	PVAVS	25600	0.946	0.211	37	0	28	17	33.9	5.2
AHU Retail	VAVS	8572	0.964	0.052	42	0	59	61	33.2	79.8
FCU Mech	VAVS	32266	0.858	0.064	38	0	22	14	105.9	26.8
AHU Assembly	VAVS	133591	1.083	0.523	54	30	43	68	36.2	32.3
System_38082	PSZ	9000	1.436	0.038	40	72	22	24	23.7	44.8
System_38083	PSZ	40578	1.636	0.034	45	81	26	20	36.4	27.3
System_38084	PSZ	40476	1.531	0.036	42	76	25	21	27.1	35.9
System_38085	PSZ	9010	0.801	0.069	23	43	11	13	16.9	24.9
System_38086	PSZ	88202	0.775	0.071	22	42	8	4	17.6	2.5
System_38087	PSZ	40578	1.665	0.033	46	82	26	20	35.9	28.2
System_38088	PSZ	40476	1.517	0.036	42	76	24	21	26.8	36
System_38089	PSZ	9010	1.719	0.032	47	85	26	21	38.2	28.9
System_38090	PSZ	9000	0.803	0.069	23	43	11	15	14.3	30.9
System_38091	PSZ	88200	0.777	0.071	23	42	8	4	17.3	2.6

Alternative A: Mitigated Case

VisualDOE 4.1 - Systems Summary **April 3, 2014**

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt A Design Case
Case Description: Full build-out Phase 1A 1B 2 3 4
Number of Systems: 25

Systems Summary

Name	Type	Conditioned Area (ft²)	Supply Air (CFM)	Min. OA Ratio	Cooling Cap (kBtu/h)	Heating Cap (kBtu/h)	Cooling Peak (kBtu/h)	Heating Peak (kBtu/h)	Cooling Energy (MBtu)	Heating Energy (MBtu)
System_38073	FPFC	88200	64335	0.075	0	0	819.2	403.7	1071	208.9
AHU Office	VAVS	268675	251891	0.091	12944.9	0	5509.1	3791.2	9178.1	2793.3
AHU Slots	VAVS	73898	241638	0.2	13564.6	0	7603.5	448.7	26659.3	1037
AHU Tables	VAVS	65980	233177	0.2	13049.9	0	6750.3	918.3	22208.3	5.2
AHU Restaurant	VAVS	92710	140794	0.47	8159.4	3135.5	6065.3	8854	6561.1	2023.6
AHU Water Park	VAVS	25600	23083	0.222	1277.1	0	983.9	1365.9	625.5	308.4
AHU Retail	VAVS	8572	7761	0.055	362.3	0	298.1	490.1	183.1	219.2
FCU Mech	VAVS	32266	26381	0.067	1327.9	0	582.3	91.7	971.2	3.5
AHU Assembly	VAVS	133591	139496	0.543	8095.1	4211.7	5090.4	8772.4	4343.8	3957.3
System_38082	FPFC	9000	11133	0.044	0	0	194.3	216.3	97.4	193.7
System_38083	FPFC	40578	60122	0.037	0	0	983.4	687.1	870.1	681.2
System_38084	FPFC	40476	51214	0.043	0	0	701.7	830.6	475.5	686
System_38085	FPFC	9010	6749	0.073	0	0	99.6	112.6	67.4	86.1
System_38086	FPFC	88202	64501	0.075	0	0	846	287.7	909	34.3
System_38087	FPFC	40578	65383	0.034	0	0	1099.7	740.4	862.1	415.8
System_38088	FPFC	40476	59792	0.037	0	0	817.2	823.7	590.1	628.4
System_38089	FPFC	9010	15063	0.033	0	0	181.7	184.3	188.9	97.3
System_38090	FPFC	9000	6747	0.073	0	0	101.8	126.3	67	104.6
System_38091	FPFC	88200	64615	0.075	0	0	849.8	294.9	923.7	35
System_38092	FPFC	9000	12843	0.039	0	0	228.7	220.6	129.4	191
System_38093	FPFC	40578	66926	0.033	0	0	1107.3	737.7	916.7	403.4
System_38094	FPFC	40476	61931	0.036	0	0	844.4	818.5	655	635.4
System_38095	FPFC	9010	16005	0.031	0	0	200.4	182.9	220.9	92.9
AHU Meeting	VAVS	24415	51882	1	2997.6	4114.8	1366.5	3262.7	1730.2	1026.5
Kitchen MAU	RHFS	1	50000	1	2668.4	0	3714.6	3157.2	4369.7	8886.8

Systems Summary per Conditioned Area

Name	Type	Conditioned Area (ft²)	Supply Air (CFM/ft²)	Min. OA Ratio	Cooling Cap (Btu/h/ft²)	Heating Cap (Btu/h/ft²)	Cooling Peak (Btu/h/ft²)	Heating Peak (Btu/h/ft²)	Cooling Energy (kBtu/ft²)	Heating Energy (kBtu/ft²)
System_38073	FPFC	88200	0.729	0.075	0	0	9	5	12.1	2.4
AHU Office	VAVS	268675	0.938	0.091	48	0	21	14	34.2	10.4
AHU Slots	VAVS	73898	3.27	0.2	184	0	103	6	360.8	14
AHU Tables	VAVS	65980	3.534	0.2	198	0	102	14	336.6	0.1
AHU Restaurant	VAVS	92710	1.519	0.47	88	34	65	96	70.8	21.8
AHU Water Park	VAVS	25600	0.902	0.222	50	0	38	53	24.4	12
AHU Retail	VAVS	8572	0.905	0.055	42	0	35	57	21.4	25.6
FCU Mech	VAVS	32266	0.818	0.067	41	0	18	3	30.1	0.1
AHU Assembly	VAVS	133591	1.044	0.543	61	32	38	66	32.5	29.6
System_38082	FPFC	9000	1.237	0.044	0	0	22	24	10.8	21.5
System_38083	FPFC	40578	1.482	0.037	0	0	24	17	21.4	16.8
System_38084	FPFC	40476	1.265	0.043	0	0	17	21	11.7	16.9
System_38085	FPFC	9010	0.749	0.073	0	0	11	13	7.5	9.6
System_38086	FPFC	88202	0.731	0.075	0	0	10	3	10.3	0.4
System_38087	FPFC	40578	1.611	0.034	0	0	27	18	21.2	10.2
System_38088	FPFC	40476	1.477	0.037	0	0	20	20	14.6	15.5
System_38089	FPFC	9010	1.672	0.033	0	0	20	20	21	10.8
System_38090	FPFC	9000	0.75	0.073	0	0	11	14	7.4	11.6
System_38091	FPFC	88200	0.733	0.075	0	0	10	3	10.5	0.4
System_38092	FPFC	9000	1.427	0.039	0	0	25	25	14.4	21.2
System_38093	FPFC	40578	1.649	0.033	0	0	27	18	22.6	9.9

Alternative A: Base Case

VisualDOE 4.1 - Systems Summary **April 3, 2014**

System_38092	PSZ	9000	1.481	0.037	41	74	24	24	24.5	44.7
System_38093	PSZ	40578	1.681	0.033	46	83	27	20	36.7	27.9
System_38094	PSZ	40476	1.567	0.035	43	78	26	21	27.7	35.7
System_38095	PSZ	9010	1.823	0.03	50	90	28	22	41.9	28.3
AHU Meeting	VAVS	24415	2.125	1	107	169	99	136	70.1	44.3
AHU MAU Ph1	RHFS	1	50000	1	2173158	0	2946320	3144017	3928549	8462109

Alternative A: Mitigated Case

VisualDOE 4.1 - Systems Summary **April 3, 2014**

System_38094	FPFC	40476	1.53	0.036	0	0	21	20	16.2	15.7
System_38095	FPFC	9010	1.776	0.031	0	0	22	20	24.5	10.3
AHU Meeting	VAVS	24415	2.125	1	123	169	56	134	70.9	42
Kitchen MAU	RHFS	1	50000	1	2668372	0	3714611	3157236	4369668	8886831

Alternative A: Base Case

Individual System
Name: System_38073
Type: Packaged Single Zone
Occupancy: Hotel
Control Zone: Room_0120 htl
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 88200.0
Average Air Flow per Conditioned Area (cfm/ft²): 0.77

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3650.1	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		68163

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1977.96
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: System_38073
Type: Four Pipe Fan Coil
Occupancy: HtlRoomCtrl
Control Zone: Room_0120 htl
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 88200.0
Average Air Flow per Conditioned Area (cfm/ft²): 0.73

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		64335

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: AHU Office
Type: Variable Air Volume
Occupancy: Office
Control Zone: Room_7001 office 8
Number of Conditioned Zones Served: 53
Total Conditioned Area Served (ft²): 268675.3
Average Air Flow per Conditioned Area (cfm/ft²): 0.98

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	263094

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	11706.5
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: AHU Office
Type: Variable Air Volume
Occupancy: Office
Control Zone: Room_7001 office 8
Number of Conditioned Zones Served: 53
Total Conditioned Area Served (ft²): 268675.3
Average Air Flow per Conditioned Area (cfm/ft²): 0.94

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	251891

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	12944.89
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: AHU Slots
Type: Variable Air Volume
Occupancy: Casino Gaming
Control Zone: Room_6000 casino slots
Number of Conditioned Zones Served: 3
Total Conditioned Area Served (ft²): 73897.8
Average Air Flow per Conditioned Area (cfm/ft²): 3.32

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	245578

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	12518.87
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: AHU Slots
Type: Variable Air Volume
Occupancy: Casino Gaming
Control Zone: Room_6000 casino slots
Number of Conditioned Zones Served: 3
Total Conditioned Area Served (ft²): 73897.8
Average Air Flow per Conditioned Area (cfm/ft²): 3.27

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Heat Recovery

Heat Recovery Effectiveness	80%

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	241638

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	13564.62
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: AHU Tables
Type: Variable Air Volume
Occupancy: Casino Gaming
Control Zone: Room_6003 casino
Number of Conditioned Zones Served: 2
Total Conditioned Area Served (ft²): 65980.3
Average Air Flow per Conditioned Area (cfm/ft²): 3.57

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	235852

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	11936.03
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: AHU Tables
Type: Variable Air Volume
Occupancy: Casino Gaming
Control Zone: Room_6002 casino
Number of Conditioned Zones Served: 2
Total Conditioned Area Served (ft²): 65980.3
Average Air Flow per Conditioned Area (cfm/ft²): 3.53

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Heat Recovery

Heat Recovery Effectiveness	80%

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	233177

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	13049.85
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: AHU Restaurant
Type: Variable Air Volume
Occupancy: Restaurant VAV
Control Zone: Room_5000 bar 16
Number of Conditioned Zones Served: 22
Total Conditioned Area Served (ft²): 92710.1
Average Air Flow per Conditioned Area (cfm/ft²): 1.52

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Autosized Capacity	3135.52
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	140794

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	8159.41
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: AHU Restaurant
Type: Variable Air Volume
Occupancy: Restaurant
Control Zone: Room_5000 bar 16
Number of Conditioned Zones Served: 22
Total Conditioned Area Served (ft²): 92710.1
Average Air Flow per Conditioned Area (cfm/ft²): 1.56

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Autosized Capacity	3251.75
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Constant Volume
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	144897

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	7370.48
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: AHU Water Park
Type: Packaged Variable Air Volume
Occupancy: Assembly
Control Zone: Room_4778 wtrprk
Number of Conditioned Zones Served: 5
Total Conditioned Area Served (ft²): 25600.0
Average Air Flow per Conditioned Area (cfm/ft²): 0.95

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Constant Volume
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	24220

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	952.76
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: AHU Water Park
Type: Variable Air Volume
Occupancy: Assembly
Control Zone: Room_4778 wtrprk
Number of Conditioned Zones Served: 5
Total Conditioned Area Served (ft²): 25600.0
Average Air Flow per Conditioned Area (cfm/ft²): 0.90

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	23083

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1277.09
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: AHU Retail
Type: Variable Air Volume
Occupancy: Retail
Control Zone: Room_3000 Retail 18
Number of Conditioned Zones Served: 3
Total Conditioned Area Served (ft²): 8571.6
Average Air Flow per Conditioned Area (cfm/ft²): 0.96

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Constant Volume
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	8259

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	358.57
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: AHU Retail
Type: Variable Air Volume
Occupancy: Retail
Control Zone: Room_3000 Retail 18
Number of Conditioned Zones Served: 3
Total Conditioned Area Served (ft²): 8571.6
Average Air Flow per Conditioned Area (cfm/ft²): 0.91

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	7761

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	362.28
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: FCU Mech
Type: Variable Air Volume
Occupancy: Office
Control Zone: Room_8000 mech
Number of Conditioned Zones Served: 6
Total Conditioned Area Served (ft²): 32266.4
Average Air Flow per Conditioned Area (cfm/ft²): 0.86

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	27672

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1217.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: FCU Mech
Type: Variable Air Volume
Occupancy: Office
Control Zone: Room_8000 mech
Number of Conditioned Zones Served: 6
Total Conditioned Area Served (ft²): 32266.4
Average Air Flow per Conditioned Area (cfm/ft²): 0.82

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	26381

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1327.91
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: AHU Assembly
Type: Variable Air Volume
Occupancy: Assembly
Control Zone: Room_1000 corr 45-46
Number of Conditioned Zones Served: 16
Total Conditioned Area Served (ft²): 133591.3
Average Air Flow per Conditioned Area (cfm/ft²): 1.08

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Autosized Capacity	4057.34
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	144692

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	7201.34
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: AHU Assembly
Type: Variable Air Volume
Occupancy: Assembly
Control Zone: Room_1000 corr 45-46
Number of Conditioned Zones Served: 16
Total Conditioned Area Served (ft²): 133591.3
Average Air Flow per Conditioned Area (cfm/ft²): 1.04

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Autosized Capacity	4211.7
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	139496

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	8095.14
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: System_38082
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 8999.6
Average Air Flow per Conditioned Area (cfm/ft²): 1.44

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	646.97	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		12924

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	359.48
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: System_38082
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 8999.6
Average Air Flow per Conditioned Area (cfm/ft²): 1.24

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		11133

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: System_38083
Type: Packaged Single Zone
Occupancy: Hotel
Control Zone: Room_0122 htl
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40578.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.64

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3290.34	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		66385

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1822.46
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: System_38083
Type: Four Pipe Fan Coil
Occupancy: HtlRoomCtrl
Control Zone: Room_0122 htl
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40578.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.48

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		60122

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: System_38084
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40476.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.53

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3086.32	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		61964

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1714.11
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: System_38084
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40476.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.27

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		51214

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: System_38085
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 9010.5
Average Air Flow per Conditioned Area (cfm/ft²): 0.80

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	384.61	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		7218

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	208.85
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: System_38085
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 9010.5
Average Air Flow per Conditioned Area (cfm/ft²): 0.75

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		6749

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: System_38086
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 88201.5
Average Air Flow per Conditioned Area (cfm/ft²): 0.78

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3660.81	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		68396

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1984.16
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: System_38086
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 88201.5
Average Air Flow per Conditioned Area (cfm/ft²): 0.73

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		64501

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: System_38087
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40578.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.66

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3344.33	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		67558

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1853.61
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: System_38087
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40578.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.61

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		65383

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: System_38088
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40476.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.52

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3061.05	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		61414

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1699.52
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: System_38088
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40476.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.48

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		59792

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: System_38089
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 9010.5
Average Air Flow per Conditioned Area (cfm/ft²): 1.72

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	765.11	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		15490

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	423.55
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: System_38089
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 9010.5
Average Air Flow per Conditioned Area (cfm/ft²): 1.67

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		15063

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: System_38090
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 9000.0
Average Air Flow per Conditioned Area (cfm/ft²): 0.80

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	384.87	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		7225

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	209.02
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: System_38090
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 9000.0
Average Air Flow per Conditioned Area (cfm/ft²): 0.75

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		6747

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: System_38091
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 88199.9
Average Air Flow per Conditioned Area (cfm/ft²): 0.78

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3666.49	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		68519

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1987.45
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: System_38091
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 88199.9
Average Air Flow per Conditioned Area (cfm/ft²): 0.73

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		64615

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: System_38092
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 8999.6
Average Air Flow per Conditioned Area (cfm/ft²): 1.48

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	665.63	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		13330

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	370.25
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: System_38092
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 8999.6
Average Air Flow per Conditioned Area (cfm/ft²): 1.43

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		12843

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: System_38093
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40578.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.68

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3375.04	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		68225

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1871.33
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: System_38093
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40578.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.65

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		66926

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: System_38094
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40475.9
Average Air Flow per Conditioned Area (cfm/ft²): 1.57

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3153.27	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		63419

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1752.75
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: System_38094
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40475.9
Average Air Flow per Conditioned Area (cfm/ft²): 1.53

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		61931

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: System_38095
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 9010.5
Average Air Flow per Conditioned Area (cfm/ft²): 1.82

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	808.07	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		16424

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	448.33
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: System_38095
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 9010.5
Average Air Flow per Conditioned Area (cfm/ft²): 1.78

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		16005

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: AHU Meeting
Type: Variable Air Volume
Occupancy: Assembly
Control Zone: Room_1003 meeting 41-43
Number of Conditioned Zones Served: 2
Total Conditioned Area Served (ft²): 24415.0
Average Air Flow per Conditioned Area (cfm/ft²): 2.13

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Autosized Capacity	4114.82
Heat Source	Furnace

Furnace

Thermal Efficiency	0.8
Auxillary Power (kW)	0
Pilot Light (Btu/hr)	500

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	51882

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	2613.26
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: AHU Meeting
Type: Variable Air Volume
Occupancy: Assembly
Control Zone: Room_1003 meeting 41-43
Number of Conditioned Zones Served: 2
Total Conditioned Area Served (ft²): 24415.0
Average Air Flow per Conditioned Area (cfm/ft²): 2.13

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Autosized Capacity	4114.82
Heat Source	Hot Water from Plant

Heat Recovery

Heat Recovery Effectiveness	80%

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	51882

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	2997.61
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Base Case

Individual System
Name: AHU MAU Ph1
Type: Constant Volume Reheat Fan System
Occupancy: Restaurant
Control Zone: Kitchen MAU
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 1.0
Average Air Flow per Conditioned Area (cfm/ft²): 50000.00

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Furnace	

Furnace

Thermal Efficiency	0.8
Auxillary Power (kW)	0
Pilot Light (Btu/hr)	500

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.000683	
Motor Efficiency	0.95	
Delta-T	0.8 °F	
Air Flow (cfm)		50000

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	2173.16
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative A: Mitigated Case

Individual System
Name: Kitchen MAU
Type: Constant Volume Reheat Fan System
Occupancy: Restaurant
Control Zone: Kitchen MAU
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 1.0
Average Air Flow per Conditioned Area (cfm/ft²): 50000.00

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Furnace	

Furnace

Thermal Efficiency	0.8
Auxillary Power (kW)	0
Pilot Light (Btu/hr)	500

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.000683	
Motor Efficiency	0.95	
Delta-T	0.8 °F	
Air Flow (cfm)		50000

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	2668.37
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Project Information

Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Weather File: MA_Boston_Logan_Intl_Arp
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Calculation Engine: DOE-2.1E-119

Electrical Use Summary

Alternative	Lights	Equipment	Cooling	Tower/Heat Reject.	Pumps/Aux.	Fans	Ext. Lights	Ext. Equip.	Total
Electrical End-use Totals (kWh)									
Alt A Base Case	8,703,700	18,381,950	7,018,672	1,042,411	349,411	9,745,123	528,885	156,658	45,926,810
Alt A Design Case	6,072,868	18,381,950	4,014,598	365,474	292,043	5,387,104	459,900	156,658	35,130,600
Incremental Electrical Savings (kWh)	(compared with previous alternative, negative savings represent increases)								
Alt A Design Case	2,630,832	0	3,004,074	676,937	57,368	4,358,019	68,985	0	10,796,210

Fuel Use Summary

Alternative	Source	Heating	Hot Water	Total
Fuel End-Use Totals				
Alt A Base Case - Natural Gas (Therm)	808,123	441,804	523,664	1,773,591
Alt A Design Case - Natural Gas (Therm)	797,333	326,904	490,152	1,614,389
Incremental Fuel Savings	(compared with previous alternative, negative savings represent increases)			
Alt A Design Case - Natural Gas (Therm)	10,790	114,900	33,512	159,202

Energy Cost Summary ($/y)

Alternative	Total Electric	Total Fuel	Total Utility	Incremental First Cost	PV Life Cycle Cost*
Total Energy Cost ($/y)					
Alt A Base Case	$6,686,938	$1,897,738	$8,584,676	$0	$73,086,180
Alt A Design Case	$5,115,016	$1,727,375	$6,842,391	$0	$58,253,130
Incremental Energy Cost Savings ($/y)		(compared with previous alternative, negative savings represent increases)			
Alt A Design Case	$1,571,922	$170,363	$1,742,285	$0	$14,833,050

* 20 year life cycle w/ 10% discount rate.

Monthly Electrical Usage (kWh)

Alternative	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Alt A Base Case	3,626,842	3,258,016	3,607,335	3,418,124	3,854,436	4,096,510	4,717,489	4,631,540	4,066,878	3,667,427	3,416,535	3,565,647
Alt A Design Case	2,782,160	2,484,563	2,752,860	2,607,484	2,950,835	3,148,545	3,614,312	3,543,160	3,113,904	2,807,857	2,604,314	2,720,619

Monthly Electrical Power Demand (kW)

Alternative	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Alt A Base Case	6,324	6,095	6,252	7,287	7,421	8,126	8,199	7,964	7,399	6,712	6,103	6,056
Alt A Design Case	5,342	4,752	4,875	5,711	5,945	6,513	6,476	6,416	5,917	5,537	4,696	4,682

Monthly Fuel Usage

Alternative	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Alt A Base Case - Natural Gas (Therm)	219,681	184,567	178,213	146,653	130,696	117,568	114,153	112,475	110,086	125,685	149,344	184,465
Alt A Design Case - Natural Gas (Therm)	196,404	163,433	158,151	131,917	122,122	111,463	109,297	107,587	104,474	115,297	131,487	162,741

Alternative B: Base Case

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Gross Area: 1,310,836 ft²
Conditioned Area: 612,670 ft²
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt B Base Case
Case Description: Phase 1a 4
Number of Blocks: 9

Block 1, Level 2: PH 1a

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	32	Number of Floors	1
Number of Facades	8		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	-311.4	-1845.0
Y	0	Pt. 2	-398.7	-1845.0
Z	14	Pt. 3	-499.2	-1745.2
		Pt. 4	-506.8	-1752.7
		Pt. 5	-561.5	-1752.7
		Pt. 6	-561.5	-1619.3
		Pt. 7	-561.5	-1532.6
		Pt. 8	-462.8	-1532.6
		Pt. 9	-462.8	-1573.1
		Pt. 10	-454.3	-1573.1
		Pt. 11	-442.4	-1573.1
		Pt. 12	-442.4	-1547.0
		Pt. 13	-442.4	-1532.0
		Pt. 14	-227.8	-1532.0
		Pt. 15	-171.3	-1532.0
		Pt. 16	-66.1	-1532.0
		Pt. 17	-18.1	-1532.0
		Pt. 18	-18.1	-1547.0
		Pt. 19	-18.1	-1575.3
		Pt. 20	2.2	-1575.3
		Pt. 21	2.2	-1532.5
		Pt. 22	163.8	-1532.5
		Pt. 23	163.8	-1587.4
		Pt. 24	163.8	-1650.4
		Pt. 25	149.4	-1661.8
		Pt. 26	125.9	-1640.6
		Pt. 27	105.9	-1661.8
		Pt. 28	95.1	-1653.3
		Pt. 29	79.7	-1674.8
		Pt. 30	119.5	-1699.5
		Pt. 31	112.2	-1714.4
		Pt. 32	107.4	-1723.3
		Pt. 33	119.3	-1727.8
		Pt. 34	110.3	-1775.0
		Pt. 35	99.7	-1775.0
		Pt. 36	102.1	-1801.6
		Pt. 37	94.4	-1802.3
		Pt. 38	96.4	-1810.1
		Pt. 39	68.2	-1816.0
		Pt. 40	28.5	-1824.7
		Pt. 41	11.3	-1828.5
		Pt. 42	11.3	-1836.6
		Pt. 43	-79.6	-1836.6
		Pt. 44	-98.7	-1855.8
		Pt. 45	-71.9	-1977.1
		Pt. 46	-67.4	-1997.8

Alternative B: Mitigated Case

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Gross Area: 1,310,836 ft²
Conditioned Area: 612,670 ft²
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt B Design Case
Case Description: Phase 1a 4
Number of Blocks: 9

Block 1, Level 2: PH 1a

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	32	Number of Floors	1
Number of Facades	8		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	-311.4	-1845.0
Y	0	Pt. 2	-398.7	-1845.0
Z	14	Pt. 3	-499.2	-1745.2
		Pt. 4	-506.8	-1752.7
		Pt. 5	-561.5	-1752.7
		Pt. 6	-561.5	-1619.3
		Pt. 7	-561.5	-1532.6
		Pt. 8	-462.8	-1532.6
		Pt. 9	-462.8	-1573.1
		Pt. 10	-454.3	-1573.1
		Pt. 11	-442.4	-1573.1
		Pt. 12	-442.4	-1547.0
		Pt. 13	-442.4	-1532.0
		Pt. 14	-227.8	-1532.0
		Pt. 15	-171.3	-1532.0
		Pt. 16	-66.1	-1532.0
		Pt. 17	-18.1	-1532.0
		Pt. 18	-18.1	-1547.0
		Pt. 19	-18.1	-1575.3
		Pt. 20	2.2	-1575.3
		Pt. 21	2.2	-1532.5
		Pt. 22	163.8	-1532.5
		Pt. 23	163.8	-1587.4
		Pt. 24	163.8	-1650.4
		Pt. 25	149.4	-1661.8
		Pt. 26	125.9	-1640.6
		Pt. 27	105.9	-1661.8
		Pt. 28	95.1	-1653.3
		Pt. 29	79.7	-1674.8
		Pt. 30	119.5	-1699.5
		Pt. 31	112.2	-1714.4
		Pt. 32	107.4	-1723.3
		Pt. 33	119.3	-1727.8
		Pt. 34	110.3	-1775.0
		Pt. 35	99.7	-1775.0
		Pt. 36	102.1	-1801.6
		Pt. 37	94.4	-1802.3
		Pt. 38	96.4	-1810.1
		Pt. 39	68.2	-1816.0
		Pt. 40	28.5	-1824.7
		Pt. 41	11.3	-1828.5
		Pt. 42	11.3	-1836.6
		Pt. 43	-79.6	-1836.6
		Pt. 44	-98.7	-1855.8
		Pt. 45	-71.9	-1977.1
		Pt. 46	-67.4	-1997.8

Alternative B: Base Case

Pt. 47	-127.3	-1997.8
Pt. 48	-127.3	-1955.0
Pt. 49	-135.3	-1911.5
Pt. 50	-153.7	-1877.7
Pt. 51	-197.9	-1850.5
Pt. 52	-221.1	-1845.0

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_221854 g	5	7.5	5
Surface_221856 g	5	7.5	5
Surface_221857 g	5	7.5	5
Surface_221896 g	5	7.5	5
Surface_221962 g	5	7.5	5
Surface_221964 g	5	7.5	5
Surface_222026 g	5	7.5	5
Surface_222072 g	5	7.5	5
Surface_222074 g	5	7.5	5
Surface_222076 g	5	7.5	5
Surface_222077 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22185 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22185 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22185 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22189 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22196 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22196 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22202 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_221709	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221817	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221818	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221819	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221822	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221823	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221824	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221841	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221842	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221843	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative B: Mitigated Case

Pt. 47	-127.3	-1997.8
Pt. 48	-127.3	-1955.0
Pt. 49	-135.3	-1911.5
Pt. 50	-153.7	-1877.7
Pt. 51	-197.9	-1850.5
Pt. 52	-221.1	-1845.0

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_221854 g	5	7.5	5
Surface_221856 g	5	7.5	5
Surface_221857 g	5	7.5	5
Surface_221896 g	5	7.5	5
Surface_221962 g	5	7.5	5
Surface_221964 g	5	7.5	5
Surface_222026 g	5	7.5	5
Surface_222072 g	5	7.5	5
Surface_222074 g	5	7.5	5
Surface_222076 g	5	7.5	5
Surface_222077 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22185 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22185 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22185 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22189 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22196 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22196 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22202 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_221709	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221817	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221818	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221819	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221822	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221823	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221824	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221841	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221842	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221843	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative B: Base Case

Surface_221844	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221845	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221853	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221854	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221856	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221857	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221892	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221896	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221898	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221899	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221900	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221901	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221915	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222056	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221952	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221953	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221954	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221962	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221963	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221964	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221965	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221966	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221967	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221969	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221970	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222011	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222012	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222025	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222026	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_222050	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222051	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222052	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222053	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222054	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222055	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222068	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222070	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222072	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_222074	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_222075	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222076	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_222077	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							

Alternative B: Mitigated Case

Surface_221844	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221845	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221853	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221854	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221856	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221857	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221892	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221896	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221898	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221899	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221900	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221901	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221915	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222056	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221952	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221953	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221954	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221962	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221963	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221964	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221965	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221966	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221967	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221969	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221970	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222011	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222012	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222025	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222026	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_222050	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222051	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222052	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222053	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222054	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222055	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222068	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222070	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222072	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_222074	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_222075	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222076	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_222077	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							

Alternative B: Base Case

Block 2, Level 1: Garage 1

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	1 ft
Number of Zones	1	Number of Floors	4
Number of Facades	12		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	1139.3	-1753.0
Y	0	Pt. 2	1139.3	-2106.0
Z	0	Pt. 3	786.3	-2106.0
		Pt. 4	786.3	-1753.0

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228915	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228916	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228917	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228918	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative B: Mitigated Case

Block 2, Level 1: Garage 1

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	1 ft
Number of Zones	1	Number of Floors	4
Number of Facades	12		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	1139.3	-1753.0
Y	0	Pt. 2	1139.3	-2106.0
Z	0	Pt. 3	786.3	-2106.0
		Pt. 4	786.3	-1753.0

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	garage rf	0.250	10.6
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228915	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228916	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228917	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228918	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative B: Base Case

Block 3, Level 1: PH 4 Wtr Prk htl

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	10	Number of Floors	12
Number of Facades	4		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	641.4	-174.1
Y	0	Pt. 2	450.3	-28.9
Z	0	Pt. 3	489.6	22.9
		Pt. 4	680.7	-122.3

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surf_36878	6	4.5	5.5
Surf_36887	6	4.5	5.5
Surf_36892	6	4.5	5.5
Surf_36899	6	4.5	5.5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surf_36878	0	No	No	n.a.	n.a.	n.a.	n.a.
Surf_36887	0	No	No	n.a.	n.a.	n.a.	n.a.
Surf_36892	0	No	No	n.a.	n.a.	n.a.	n.a.
Surf_36899	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_36878	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surf_36887	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surf_36892	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surf_36899	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2

Alternative B: Mitigated Case

Block 3, Level 1: PH 4 Wtr Prk htl

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	10	Number of Floors	12
Number of Facades	4		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	641.4	-174.1
Y	0	Pt. 2	450.3	-28.9
Z	0	Pt. 3	489.6	22.9
		Pt. 4	680.7	-122.3

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surf_36878	6	4.5	5.5
Surf_36887	6	4.5	5.5
Surf_36892	6	4.5	5.5
Surf_36899	6	4.5	5.5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surf_36878	0	No	No	n.a.	n.a.	n.a.	n.a.
Surf_36887	0	No	No	n.a.	n.a.	n.a.	n.a.
Surf_36892	0	No	No	n.a.	n.a.	n.a.	n.a.
Surf_36899	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_36878	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surf_36887	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surf_36892	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surf_36899	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2

Alternative B: Base Case

Block 4, Level 1: PH 4 Wtr Prk

Block Information	
Shape	Rect
Zoning	Perimeter Interior
Zone Depth	15 ft
Number of Zones	6
Number of Facades	4

Ceiling and Plenum Heights	
Floor to Floor Height	13 ft
Plenum Height	4 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Widths (ft)		Depths (ft)	
X	0	Width	160	Depth	160
Y	0				
Z	0				

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_146672	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_146676	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_146680	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_146683	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative B: Mitigated Case

Block 4, Level 1: PH 4 Wtr Prk

Block Information	
Shape	Rect
Zoning	Perimeter Interior
Zone Depth	15 ft
Number of Zones	6
Number of Facades	4

Ceiling and Plenum Heights	
Floor to Floor Height	13 ft
Plenum Height	4 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Widths (ft)		Depths (ft)	
X	0	Width	160	Depth	160
Y	0				
Z	0				

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_146672	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surf_146676	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surf_146680	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surf_146683	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative B: Base Case

Block 5, Level 1: PH 1a Lower Level

Block Information	
Shape	CUSTOMBLK
Zoning	Custom
Number of Zones	15
Number of Facades	55

Ceiling and Plenum Heights	
Floor to Floor Height	14 ft
Plenum Height	4 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	192.9	-2059.8
Y	0	Pt. 2	301.9	-2059.8
Z	0	Pt. 3	301.9	-2068.0
		Pt. 4	321.2	-2068.0
		Pt. 5	321.3	-2244.8
		Pt. 6	302.0	-2244.8
		Pt. 7	302.0	-2256.1
		Pt. 8	220.9	-2256.1
		Pt. 9	220.9	-2181.3
		Pt. 10	211.9	-2181.3
		Pt. 11	211.9	-2166.3
		Pt. 12	192.9	-2166.3
		Pt. 13	192.9	-2135.0
		Pt. 14	132.2	-2135.0
		Pt. 15	132.2	-2257.5
		Pt. 16	-7.0	-2257.5
		Pt. 17	-127.3	-2126.8
		Pt. 18	-127.3	-1955.0
		Pt. 19	-142.8	-1897.5
		Pt. 20	-170.3	-1874.3
		Pt. 21	-200.3	-1855.4
		Pt. 22	-230.3	-1847.5
		Pt. 23	-270.0	-1847.5
		Pt. 24	-417.0	-1847.5
		Pt. 25	-433.8	-1830.7
		Pt. 26	-562.8	-1701.8
		Pt. 27	-562.8	-1653.1
		Pt. 28	-562.8	-1589.5
		Pt. 29	-562.8	-1532.0
		Pt. 30	-527.9	-1532.0
		Pt. 31	-440.3	-1532.0
		Pt. 32	-364.8	-1532.0
		Pt. 33	-171.5	-1532.0
		Pt. 34	-17.8	-1532.0
		Pt. 35	-17.8	-1566.1
		Pt. 36	3.2	-1566.1
		Pt. 37	3.2	-1532.0
		Pt. 38	162.4	-1532.0
		Pt. 39	162.4	-1659.4
		Pt. 40	129.7	-1695.1
		Pt. 41	109.8	-1741.8
		Pt. 42	106.7	-1786.8
		Pt. 43	106.7	-1805.7
		Pt. 44	12.9	-1805.7
		Pt. 45	12.9	-1854.2
		Pt. 46	37.8	-1854.2
		Pt. 47	42.1	-1865.0
		Pt. 48	57.7	-1895.3
		Pt. 49	79.4	-1925.0
		Pt. 50	99.7	-1945.9
		Pt. 51	110.7	-1955.2
		Pt. 52	129.7	-1968.7
		Pt. 53	159.7	-1985.0
		Pt. 54	192.9	-1996.7
		Pt. 55	192.9	-2013.0

Block Constructions

Alternative B: Mitigated Case

Block 5, Level 1: PH 1a Lower Level

Block Information	
Shape	CUSTOMBLK
Zoning	Custom
Number of Zones	15
Number of Facades	55

Ceiling and Plenum Heights	
Floor to Floor Height	14 ft
Plenum Height	4 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	192.9	-2059.8
Y	0	Pt. 2	301.9	-2059.8
Z	0	Pt. 3	301.9	-2068.0
		Pt. 4	321.2	-2068.0
		Pt. 5	321.3	-2244.8
		Pt. 6	302.0	-2244.8
		Pt. 7	302.0	-2256.1
		Pt. 8	220.9	-2256.1
		Pt. 9	220.9	-2181.3
		Pt. 10	211.9	-2181.3
		Pt. 11	211.9	-2166.3
		Pt. 12	192.9	-2166.3
		Pt. 13	192.9	-2135.0
		Pt. 14	132.2	-2135.0
		Pt. 15	132.2	-2257.5
		Pt. 16	-7.0	-2257.5
		Pt. 17	-127.3	-2126.8
		Pt. 18	-127.3	-1955.0
		Pt. 19	-142.8	-1897.5
		Pt. 20	-170.3	-1874.3
		Pt. 21	-200.3	-1855.4
		Pt. 22	-230.3	-1847.5
		Pt. 23	-270.0	-1847.5
		Pt. 24	-417.0	-1847.5
		Pt. 25	-433.8	-1830.7
		Pt. 26	-562.8	-1701.8
		Pt. 27	-562.8	-1653.1
		Pt. 28	-562.8	-1589.5
		Pt. 29	-562.8	-1532.0
		Pt. 30	-527.9	-1532.0
		Pt. 31	-440.3	-1532.0
		Pt. 32	-364.8	-1532.0
		Pt. 33	-171.5	-1532.0
		Pt. 34	-17.8	-1532.0
		Pt. 35	-17.8	-1566.1
		Pt. 36	3.2	-1566.1
		Pt. 37	3.2	-1532.0
		Pt. 38	162.4	-1532.0
		Pt. 39	162.4	-1659.4
		Pt. 40	129.7	-1695.1
		Pt. 41	109.8	-1741.8
		Pt. 42	106.7	-1786.8
		Pt. 43	106.7	-1805.7
		Pt. 44	12.9	-1805.7
		Pt. 45	12.9	-1854.2
		Pt. 46	37.8	-1854.2
		Pt. 47	42.1	-1865.0
		Pt. 48	57.7	-1895.3
		Pt. 49	79.4	-1925.0
		Pt. 50	99.7	-1945.9
		Pt. 51	110.7	-1955.2
		Pt. 52	129.7	-1968.7
		Pt. 53	159.7	-1985.0
		Pt. 54	192.9	-1996.7
		Pt. 55	192.9	-2013.0

Block Constructions

Alternative B: Base Case

VisualDOE 4.1 - Architectural Details **April 3, 2014**

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_227366 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22736 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_227230	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227231	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227232	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227233	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227234	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227235	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227236	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227237	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227238	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227239	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227240	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227241	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227267	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227268	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227269	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227276	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227278	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227279	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227280	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227281	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227282	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227283	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227307	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227286	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227287	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227288	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227289	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227290	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227291	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227292	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227293	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227294	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227295	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227300	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227301	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227302	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227303	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227304	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227305	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227306	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227309	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227344	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227352	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227353	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227354	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227356	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227361	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227364	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative B: Mitigated Case

VisualDOE 4.1 - Architectural Details **April 3, 2014**

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_227366 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22736 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_227230	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227231	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227232	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227233	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227234	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227235	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227236	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227237	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227238	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227239	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227240	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227241	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227267	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227268	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227269	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227276	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227278	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227279	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227280	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227281	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227282	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227283	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227307	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227286	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227287	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227288	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227289	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227290	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227291	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227292	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227293	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227294	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227295	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227300	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227301	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227302	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227303	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227304	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227305	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227306	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227309	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227344	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227352	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227353	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227354	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227356	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227361	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227364	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative B: Base Case

Surface_227366	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_227367	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227369	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227370	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227371	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227372	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227373	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative B: Mitigated Case

Surface_227366	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_227367	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227369	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227370	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227371	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227372	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227373	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative B: Base Case

Block 6, Level 3: PH 1a lvl2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	12	Number of Floors	1
Number of Facades	28		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	9.7	-1686.1
Y	0	Pt. 2	9.7	-1715.0
Z	34	Pt. 3	-50.3	-1715.0
		Pt. 4	-50.3	-1572.7
		Pt. 5	9.7	-1572.7
		Pt. 6	9.7	-1565.0
		Pt. 7	-2.3	-1565.0
		Pt. 8	-2.3	-1533.0
		Pt. 9	163.8	-1533.0
		Pt. 10	163.8	-1654.4
		Pt. 11	205.1	-1632.7
		Pt. 12	258.9	-1624.8
		Pt. 13	421.1	-1367.6
		Pt. 14	440.4	-1378.1
		Pt. 15	281.3	-1634.1
		Pt. 16	276.9	-1651.8
		Pt. 17	206.3	-1658.9
		Pt. 18	152.8	-1700.1
		Pt. 19	127.8	-1765.8
		Pt. 20	135.0	-1819.2
		Pt. 21	77.5	-1840.2
		Pt. 22	71.0	-1822.4
		Pt. 23	97.0	-1815.8
		Pt. 24	92.1	-1775.0
		Pt. 25	99.7	-1726.7
		Pt. 26	115.7	-1714.4
		Pt. 27	88.8	-1703.3
		Pt. 28	88.8	-1685.9

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_228961 g	5	7.5	5
Surface_228981 g	10	7.5	5
Surface_228992	10	7.5	5
Surface_229002 g	5	7.5	5
Surface_229004 g	5	7.5	5
Surface_229005 g	5	7.5	5
Surface_229006 g	5	7.5	5
Surface_229007 g	5	7.5	5
Surface_229009 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22896 1 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22898 1 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative B: Mitigated Case

Block 6, Level 3: PH 1a lvl2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	12	Number of Floors	1
Number of Facades	28		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	9.7	-1686.1
Y	0	Pt. 2	9.7	-1715.0
Z	34	Pt. 3	-50.3	-1715.0
		Pt. 4	-50.3	-1572.7
		Pt. 5	9.7	-1572.7
		Pt. 6	9.7	-1565.0
		Pt. 7	-2.3	-1565.0
		Pt. 8	-2.3	-1533.0
		Pt. 9	163.8	-1533.0
		Pt. 10	163.8	-1654.4
		Pt. 11	205.1	-1632.7
		Pt. 12	258.9	-1624.8
		Pt. 13	421.1	-1367.6
		Pt. 14	440.4	-1378.1
		Pt. 15	281.3	-1634.1
		Pt. 16	276.9	-1651.8
		Pt. 17	206.3	-1658.9
		Pt. 18	152.8	-1700.1
		Pt. 19	127.8	-1765.8
		Pt. 20	135.0	-1819.2
		Pt. 21	77.5	-1840.2
		Pt. 22	71.0	-1822.4
		Pt. 23	97.0	-1815.8
		Pt. 24	92.1	-1775.0
		Pt. 25	99.7	-1726.7
		Pt. 26	115.7	-1714.4
		Pt. 27	88.8	-1703.3
		Pt. 28	88.8	-1685.9

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_228961 g	5	7.5	5
Surface_228981 g	10	7.5	5
Surface_228992	10	7.5	5
Surface_229002 g	5	7.5	5
Surface_229004 g	5	7.5	5
Surface_229005 g	5	7.5	5
Surface_229006 g	5	7.5	5
Surface_229007 g	5	7.5	5
Surface_229009 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22896 1 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22898 1 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative B: Base Case

Surface_22899 2	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 5 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 9 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228923	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228989	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228958	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228961 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_228979	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228980	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228981 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_228992	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_228995	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228996	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228997	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228998	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228999	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229000	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229001	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229002 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229003	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229004 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229005 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229006 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229007 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229008 g	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229009 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229010	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229011	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229012	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229013	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229017	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative B: Mitigated Case

Surface_22899 2	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 5 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 9 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228923	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228989	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228958	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228961 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_228979	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228980	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228981 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_228992	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_228995	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228996	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228997	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228998	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228999	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229000	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229001	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229002 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229003	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229004 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229005 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229006 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229007 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229008 g	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229009 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229010	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229011	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229012	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229013	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229017	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative B: Base Case

Block 7, Level 3: PH 1a lvl2 restaurant

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	6	Number of Floors	1
Number of Facades	6		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	-230.3	-1636.0
Y	0	Pt. 2	-230.3	-1655.0
Z	34	Pt. 3	-350.3	-1655.0
		Pt. 4	-350.2	-1565.0
		Pt. 5	-230.4	-1565.0
		Pt. 6	-230.4	-1575.2

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_228880 g	5	7.5	5
Surface_228882 g	5	7.5	5
Surface_228884 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_228880 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_228882 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_228884 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228872	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228878	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228880 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_228882 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_228883	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228884 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2

Alternative B: Mitigated Case

Block 7, Level 3: PH 1a lvl2 restaurant

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	6	Number of Floors	1
Number of Facades	6		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	-230.3	-1636.0
Y	0	Pt. 2	-230.3	-1655.0
Z	34	Pt. 3	-350.3	-1655.0
		Pt. 4	-350.2	-1565.0
		Pt. 5	-230.4	-1565.0
		Pt. 6	-230.4	-1575.2

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_228880 g	5	7.5	5
Surface_228882 g	5	7.5	5
Surface_228884 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_228880 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_228882 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_228884 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228872	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228878	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228880 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_228882 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_228883	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228884 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2

Alternative B: Base Case

Block 8, Level 3: PH 1a casino clerestory

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	15 ft
Zoning	Custom	Plenum Height	1 ft
Number of Zones	1	Number of Floors	1
Number of Facades	9		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	28.8	-1699.9
Y	0	Pt. 2	17.2	-1734.3
Z	34	Pt. 3	16.3	-1745.0
		Pt. 4	-499.2	-1745.2
		Pt. 5	-454.5	-1699.9
		Pt. 6	-50.3	-1699.9
		Pt. 7	-50.3	-1715.0
		Pt. 8	9.7	-1715.0
		Pt. 9	9.7	-1699.9

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228890	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228891	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228892	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228893	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228894	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228895	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228896	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228897	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228898	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative B: Mitigated Case

Block 8, Level 3: PH 1a casino clerestory

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	15 ft
Zoning	Custom	Plenum Height	1 ft
Number of Zones	1	Number of Floors	1
Number of Facades	9		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	28.8	-1699.9
Y	0	Pt. 2	17.2	-1734.3
Z	34	Pt. 3	16.3	-1745.0
		Pt. 4	-499.2	-1745.2
		Pt. 5	-454.5	-1699.9
		Pt. 6	-50.3	-1699.9
		Pt. 7	-50.3	-1715.0
		Pt. 8	9.7	-1715.0
		Pt. 9	9.7	-1699.9

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228890	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228891	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228892	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228893	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228894	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228895	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228896	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228897	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228898	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative B: Base Case

Block 9, Level 1: Kitchen MAU

Block Information	
Shape	Rect
Zoning	Single
Zone Depth	10 ft
Number of Zones	2
Number of Facades	4

Ceiling and Plenum Heights	
Floor to Floor Height	13 ft
Plenum Height	4 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Widths (ft)		Depths (ft)	
X	-2000	Width	1	Depth	1
Y	0				
Z	0				

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	~Adiabatic Roof	0.001	1.5
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_395826	n.a.	n.a.	n.a.	n.a.	int wall	0.001	5.3
Surf_395827	n.a.	n.a.	n.a.	n.a.	int wall	0.001	5.3
Surf_395828	n.a.	n.a.	n.a.	n.a.	int wall	0.001	5.3
Surf_395829	n.a.	n.a.	n.a.	n.a.	int wall	0.001	5.3

Alternative B: Mitigated Case

Block 9, Level 1: Kitchen MAU

Block Information	
Shape	Rect
Zoning	Single
Zone Depth	10 ft
Number of Zones	2
Number of Facades	4

Ceiling and Plenum Heights	
Floor to Floor Height	13 ft
Plenum Height	4 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Widths (ft)		Depths (ft)	
X	-2000	Width	1	Depth	1
Y	0				
Z	0				

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	~Adiabatic Roof	0.001	1.5
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_400392	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surf_400393	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surf_400394	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surf_400395	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative B: Base Case

VisualDOE 4.1 - Architectural Summary **April 3, 2014**

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt B Base Case
Case Description: Phase 1a 4
Gross Area: 1,310,836 ft²
Conditioned Area: 612,670 ft²
Window-Wall-Ratio: 14.3%
Skylight-Roof-Ratio: 0.0%
Number of Blocks: 9
Note: This report includes floor multipliers

Occupancies Summary

Name	Area (ft²)	Avg. LPD (W/ft²)	Avg. EPD (W/ft²)
Office	188,450	1.0	0.85
Hotel	187,264	1.0	0.5
Casino Gaming	75,860	1.6	10.0
Restaurant	53,767	1.6	0.79
Garage	698,166	0.3	0.2
Assembly	107,329	1.2	0.25
Restaurant VAV	1	1.6	0.79
Building Totals & Averages	1,310,836	0.7	0.93

Constructions Summary

Name	Net Area (ft²)	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)	Absorptance	Type	Category	Layers
Simulated Slab	642,066	0.03	45.6	0.0	Slabs	Light	3
Partition	186,537	0.39	1.04	0.3	Partitions	Light	3
Gyp. bd. ceiling	885,880	0.74	0.52	0.7	Ceilings	Light	1
Int Floor	2,044,917	0.18	9.33	0.7	Floors	Light	3
wl Z5 NR 90.1-07	323,067	0.06	0.2	0.7	Walls	Light	n.a.
rf Z5 NR 90.1-07	747,858	0.05	0.93	0.7	Roofs	Light	n.a.
int wall	52	0.0	5.33	0.0	Walls	Light	n.a.

Fenestrations Summary

Name	Ucog (Btu/h-ft²-°F)	SHGC	Tvis	North (ft²)	East (ft²)	South (ft²)	West (ft²)	Total (ft²)	No.
Hotel window	0.550	0.404	0.700	2,970	11,880	2,970	11,880	29,700	1200
7.5ft	0.450	0.353	0.700	6,413	1,463	6,938	4,388	19,200	512
Building Totals & Averages	0.511	0.384	0.700	9,383	13,343	9,908	16,268	48,900	1,712

Alternative B: Mitigated Case

VisualDOE 4.1 - Architectural Summary **April 3, 2014**

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt B Design Case
Case Description: Phase 1a 4
Gross Area: 1,310,836 ft²
Conditioned Area: 612,670 ft²
Window-Wall-Ratio: 14.3%
Skylight-Roof-Ratio: 0.0%
Number of Blocks: 9
Note: This report includes floor multipliers

Occupancies Summary

Name	Area (ft²)	Avg. LPD (W/ft²)	Avg. EPD (W/ft²)
Office	188,450	1.0	0.85
Casino Gaming	75,860	1.6	10.0
Restaurant	53,768	1.6	0.79
Garage	698,166	0.3	0.2
Assembly	107,329	1.2	0.25
HtlRoomCtrl	187,264	0.5	0.5
Building Totals & Averages	1,310,836	0.63	0.93

Constructions Summary

Name	Net Area (ft²)	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)	Absorptance	Type	Category	Layers
garage rf	124,609	0.25	10.62	0.7	Roofs	Light	4
Simulated Slab	642,066	0.03	45.6	0.0	Slabs	Light	3
Partition	186,537	0.39	1.04	0.3	Partitions	Light	3
Gyp. bd. ceiling	885,880	0.74	0.52	0.7	Ceilings	Light	1
Int Floor	2,044,917	0.18	9.33	0.7	Floors	Light	3
MC Wall	323,119	0.04	0.2	0.7	Walls	Light	n.a.
MC Roof	623,249	0.03	0.93	0.55	Roofs	Light	n.a.

Fenestrations Summary

Name	Ucog (Btu/h-ft²-°F)	SHGC	Tvis	North (ft²)	East (ft²)	South (ft²)	West (ft²)	Total (ft²)	No.
Hotel window	0.550	0.404	0.700	2,970	11,880	2,970	11,880	29,700	1200
7.5ft	0.450	0.353	0.700	6,413	1,463	6,938	4,388	19,200	512
Building Totals & Averages	0.511	0.384	0.700	9,383	13,343	9,908	16,268	48,900	1,712

Alternative B: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt B Base Case
Case Description: Phase 1a 4
Number of Blocks: 9

Zone Loads

Name	Area (ft²)	LPD (W/ft²)	EPD (W/ft²)	Occupancy	Occupant Density (ft²/person)	Daylight Control	Illuminance (fc)	Control Fraction	Infiltration (ach)	SS-G Max Cl/Ht (kBtu/h)
Room_6005 toilet 17	7343	1.20	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./74.05
Room_7000 office 17	4828	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./58.46
Room_7001 office 8	12027	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./92.8
Room_7002 office 8	16059	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./124.06
Room_7003 office 6	10766	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./90.09
Room_7004 office 5	6124	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./59.8
Room_7005 office 5	495	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./8.81
Room_7006 office 6	1776	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./63.93
Room_7007 office 5	1256	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./44.83
Room_7008 office 6	742	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./26.46
Room_7009 office 5	1075	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./42.08
Room_7011 corr 14	9115	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./97.82
Room_7012 locker 7	3219	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./41.5
Room_7014 office 1	25237	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./160.02
Room_7015 office 2	9696	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./53.73
Room_7016 storage	12364	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./73.65
Room_7017 office 2	2611	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./66.57
Room_7018 Office 52	2607	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./58.3
Room_7019 office 52	12246	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./108.6
Room_7020 office 52	1662	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./41.58
Room_7021 office 52	1745	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./24.61
Room_7022 office 14	2199	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./79.07
Room_7023 office 51	6052	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./54.48
Room_9001 uncond	3096	.00	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9002 ph1 garage PL	498436	.30	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9003 garage 2	177216	.30	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9005 loading	19418	.30	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.

Alternative B: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt B Design Case
Case Description: Phase 1a 4
Number of Blocks: 9

Zone Loads

Name	Area (ft²)	LPD (W/ft²)	EPD (W/ft²)	Occupancy	Occupant Density (ft²/person)	Daylight Control	Illuminance (fc)	Control Fraction	Infiltration (ach)	SS-G Max Cl/Ht (kBtu/h)
Room_6005 toilet 17	7343	.95	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./104.86
Room_7000 office 17	4828	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./77.38
Room_7001 office 8	12027	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./158.31
Room_7002 office 8	16059	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./208.2
Room_7003 office 6	10766	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./146.47
Room_7004 office 5	6124	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./93.61
Room_7005 office 5	495	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./10.76
Room_7006 office 6	1776	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./64.4
Room_7007 office 5	1256	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./45.53
Room_7008 office 6	742	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./26.75
Room_7009 office 5	1075	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./42.16
Room_7011 corr 14	9115	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./144.86
Room_7012 locker 7	3219	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./53.11
Room_7014 office 1	25237	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./268.82
Room_7015 office 2	9696	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./101.43
Room_7016 storage	12364	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./126.43
Room_7017 office 2	2611	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./71.23
Room_7018 Office 52	2607	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./66.38
Room_7019 office 52	12246	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./178.19
Room_7020 office 52	1662	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./45.87
Room_7021 office 52	1745	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./30.86
Room_7022 office 14	2199	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./73
Room_7023 office 51	6052	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./90.88
Room_8011 BOH 50	675	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./14.19
Room_8012 BOH 50	1910	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./74.85
Room_8013 BOH 50	3369	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./56.01
Room_8014 BOH 50	675	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./14.03

Alternative B: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_8015 BOH 50	1910	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./21.23
Room_8014 BOH 50	675	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./11.47
Room_8013 BOH 50	3369	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./35.67
Room_8012 BOH 50	1910	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./73.16
Room_8011 BOH 50	675	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./11.56
Room_6000 casino slots	72747	1.60	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./n.a.
Room_6004 casino cs	21617	.00	.00	Casino Gaming	100000.0	None	n.a.	n.a.	0.2	n.a./428.79
Room_6001 casino	1151	1.60	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./54.64
Room_6002 casino	1963	1.60	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./n.a.
Room_5020 restaurant 48	1850	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./224.96
Room_5019 restaurant 48	1125	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./152.08
Room_5018 restaurant 48	1612	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./142.46
Room_5017 restaurant 48	3528	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./178.76
Room_5016 kitchen 49	2677	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./136.18
Room_5008 food court 13	5479	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./260.98
Room_5007 buffet 10	11243	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./523.41
Room_5006 dining 9	2977	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./151.95
Room_5005 kitchen 11	5739	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./278.87
Room_5004 kitchen 11	720	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./43.06
Room_5003 kitchen 11 PL2	1358	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./70.55
Room_5002 kitchen 12 PL	5231	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./236.6
Room_5001 rest 9	1578	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./141.6
Room_5000 bar 16	8650	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./357.27
Room_4778 wtrprk	2175	1.20	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./42.22
Room_4779 wtrprk	2175	1.20	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./42.89
Room_4780 wtrprk	2175	1.20	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./40.98
Room_4781 wtrprk	2175	1.20	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./41.61
Room_4782 wtrprk PL	16900	1.20	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./257.7
Room_8002 mech	1114	1.00	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_8003 mech	22676	1.00	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_8004 mech	4282	1.00	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_8005 mech 14	597	1.00	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_1000 corr 45-46	16248	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1668.44
Room_1007 warehouse 4	22440	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1311.91
Room_1009 lobby 15	9429	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./685.25
Room_1015 BOH 3	10369	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./655.63

Alternative B: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_8015 BOH 50	1910	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./34.16
Room_9001 uncond	3096	.00	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9002 ph1 garage PL	498436	.10	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9003 garage 2	177216	.10	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9005 loading	19418	.10	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_6000 casino slots	72747	1.28	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./n.a.
Room_6004 casino cs	21617	.00	.00	Casino Gaming	100000.0	None	n.a.	n.a.	0.2	n.a./422.15
Room_6001 casino	1151	1.28	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./29.86
Room_6002 casino	1963	1.28	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./111.98
Room_5020 restaurant 48	1850	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./362.37
Room_5019 restaurant 48	1125	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./232.14
Room_5018 restaurant 48	1612	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./195.91
Room_5017 restaurant 48	3528	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./324.25
Room_5016 kitchen 49	2677	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./246.76
Room_5008 food court 13	5479	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./482.72
Room_5007 buffet 10	11243	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./1032.4
Room_5006 dining 9	2977	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./280.82
Room_5005 kitchen 11	5739	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./527.54
Room_5004 kitchen 11	720	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./67.92
Room_5003 kitchen 11 PL2	1358	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./125.68
Room_5002 kitchen 12 PL	5231	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./446.43
Room_5001 rest 9	1578	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./201.39
Room_5000 bar 16	8650	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./740.53
Room_4778 wtrprk	2175	.90	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./122.49
Room_4779 wtrprk	2175	.90	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./124.81
Room_4780 wtrprk	2175	.90	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./119.75
Room_4781 wtrprk	2175	.90	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./120.1
Room_4782 wtrprk PL	16900	.90	1.80	Assembly	50.0	None	n.a.	n.a.	0.2	n.a./878.8
Room_8002 mech	1114	.80	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_8003 mech	22676	.80	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_8004 mech	4282	.80	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_8005 mech 14	597	.80	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_1000 corr 45-46	16248	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1631.29
Room_1007 warehouse 4	22440	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1264.08
Room_1009 lobby 15	9429	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./665.74

Alternative B: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_1016 warehouse	18589	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1105.84
Room_1017 BOH 40	2648	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./165.09
Room_1018 BOH 40	2007	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./136.76
Room_0135 htl ph4	88200	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0136 htl ph4	9000	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0137 htl ph4	40578	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0138 htl ph4	40476	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0139 htl ph4	9011	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Kitchen MAU	1	.00	.00	Restaurant VAV	1000.0	None	n.a.	n.a.	0.2	n.a./3143.03

Supply Air

Name	Total Flow (cfm)	Flow/Area (cfm/ft²)	Air change/hour	Min. Flow Ratio	Cool/Heat Cap. (kBtu/hr)
Room_6005 toilet 17	AutoSized - 7903	0	0	0.3	n.a. / 533.4
Room_7000 office 17	AutoSized - 6032	0	0	0.3	n.a. / 407.2
Room_7001 office 8	AutoSized - 11527	0	0	0.3	n.a. / 778.1
Room_7002 office 8	AutoSized - 14696	0	0	0.3	n.a. / 992.0
Room_7003 office 6	AutoSized - 10242	0	0	0.3	n.a. / 691.3
Room_7004 office 5	AutoSized - 6015	0	0	0.3	n.a. / 406.0
Room_7005 office 5	AutoSized - 565	0	0	0.3	n.a. / 38.2
Room_7006 office 6	AutoSized - 3992	0	0	0.3	n.a. / 269.4
Room_7007 office 5	AutoSized - 1864	0	0	0.3	n.a. / 125.8
Room_7008 office 6	AutoSized - 1903	0	0	0.3	n.a. / 128.5
Room_7009 office 5	AutoSized - 2378	0	0	0.3	n.a. / 160.5
Room_7011 corr 14	AutoSized - 8620	0	0	0.3	n.a. / 581.8
Room_7012 locker 7	AutoSized - 3143	0	0	0.3	n.a. / 212.2
Room_7014 office 1	AutoSized - 22112	0	0	0.3	n.a. / 1492.6
Room_7015 office 2	AutoSized - 8413	0	0	0.3	n.a. / 567.9
Room_7016 storage	AutoSized - 10537	0	0	0.3	n.a. / 711.3
Room_7017 office 2	AutoSized - 5404	0	0	0.3	n.a. / 364.8
Room_7018 Office 52	AutoSized - 3515	0	0	0.3	n.a. / 237.2
Room_7019 office 52	AutoSized - 11867	0	0	0.3	n.a. / 801.1
Room_7020 office 52	AutoSized - 3283	0	0	0.3	n.a. / 221.6
Room_7021 office 52	AutoSized - 1693	0	0	0.3	n.a. / 114.3
Room_7022 office 14	AutoSized - 3584	0	0	0.3	n.a. / 241.9
Room_7023 office 51	AutoSized - 6039	0	0	0.3	n.a. / 407.6

Alternative B: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_1015 BOH 3	10369	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./635.03
Room_1016 warehouse	18589	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1066.57
Room_1017 BOH 40	2648	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./159.63
Room_1018 BOH 40	2007	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./130.74
Room_0135 htl ph4	88200	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	70.82/24.57
Room_0136 htl ph4	9000	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	19.06/18.38
Room_0137 htl ph4	40578	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	92.27/61.48
Room_0138 htl ph4	40476	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	70.37/68.21
Room_0139 htl ph4	9011	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	16.7/15.24
Kitchen MAU	1	.00	.00	Restaurant	1000.0	None	n.a.	n.a.	0.2	n.a./3145.11

Supply Air

Name	Total Flow (cfm)	Flow/Area (cfm/ft²)	Air change/hour	Min. Flow Ratio	Cool/Heat Cap. (kBtu/hr)
Room_6005 toilet 17	AutoSized - 7409	0	0	0.3	n.a. / 500.1
Room_7000 office 17	AutoSized - 5822	0	0	0.3	n.a. / 393.0
Room_7001 office 8	AutoSized - 11127	0	0	0.3	n.a. / 751.1
Room_7002 office 8	AutoSized - 14145	0	0	0.3	n.a. / 954.8
Room_7003 office 6	AutoSized - 9884	0	0	0.3	n.a. / 667.2
Room_7004 office 5	AutoSized - 5808	0	0	0.3	n.a. / 392.0
Room_7005 office 5	AutoSized - 510	0	0	0.3	n.a. / 34.5
Room_7006 office 6	AutoSized - 3848	0	0	0.3	n.a. / 259.8
Room_7007 office 5	AutoSized - 1758	0	0	0.3	n.a. / 118.6
Room_7008 office 6	AutoSized - 1908	0	0	0.3	n.a. / 128.8
Room_7009 office 5	AutoSized - 2287	0	0	0.3	n.a. / 154.4
Room_7011 corr 14	AutoSized - 8290	0	0	0.3	n.a. / 559.6
Room_7012 locker 7	AutoSized - 2923	0	0	0.3	n.a. / 197.3
Room_7014 office 1	AutoSized - 21246	0	0	0.3	n.a. / 1434.1
Room_7015 office 2	AutoSized - 8102	0	0	0.3	n.a. / 546.9
Room_7016 storage	AutoSized - 10076	0	0	0.3	n.a. / 680.1
Room_7017 office 2	AutoSized - 5414	0	0	0.3	n.a. / 365.4
Room_7018 Office 52	AutoSized - 3313	0	0	0.3	n.a. / 223.7
Room_7019 office 52	AutoSized - 11464	0	0	0.3	n.a. / 773.8
Room_7020 office 52	AutoSized - 3141	0	0	0.3	n.a. / 212.0
Room_7021 office 52	AutoSized - 1552	0	0	0.3	n.a. / 104.8
Room_7022 office 14	AutoSized - 3489	0	0	0.3	n.a. / 235.5

Alternative B: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_9001 uncond	unconditioned	0	0	0.3	n.a.
Room_9002 ph1 garage PL	unconditioned	0	0	0.3	n.a.
Room_9003 garage 2	unconditioned	0	0	0.3	n.a.
Room_9005 loading	unconditioned	0	0	0.3	n.a.
Room_8015 BOH 50	AutoSized - 1937	0	0	0.3	n.a. / 130.7
Room_8014 BOH 50	AutoSized - 728	0	0	0.3	n.a. / 49.1
Room_8013 BOH 50	AutoSized - 3358	0	0	0.3	n.a. / 226.7
Room_8012 BOH 50	AutoSized - 4993	0	0	0.3	n.a. / 337.0
Room_8011 BOH 50	AutoSized - 783	0	0	0.3	n.a. / 52.9
Room_6000 casino slots	AutoSized - 225557	0	0	1	n.a. / 15225.1
Room_6004 casino cs	AutoSized - 14457	0	0	1	n.a. / 975.9
Room_6001 casino	AutoSized - 5565	0	0	1	n.a. / 375.7
Room_6002 casino	AutoSized - 9705	0	0	1	n.a.
Room_5020 restaurant 48	AutoSized - 5738	0	0	1	n.a. / 387.3
Room_5019 restaurant 48	AutoSized - 3719	0	0	1	n.a. / 251.0
Room_5018 restaurant 48	AutoSized - 3221	0	0	1	n.a. / 217.4
Room_5017 restaurant 48	AutoSized - 5311	0	0	1	n.a. / 358.5
Room_5016 kitchen 49	AutoSized - 4048	0	0	1	n.a. / 273.2
Room_5008 food court 13	AutoSized - 7933	0	0	1	n.a. / 535.5
Room_5007 buffet 10	AutoSized - 16911	0	0	1	n.a. / 1141.5
Room_5006 dining 9	AutoSized - 4597	0	0	1	n.a. / 310.3
Room_5005 kitchen 11	AutoSized - 8641	0	0	1	n.a. / 583.3
Room_5004 kitchen 11	AutoSized - 1123	0	0	1	n.a. / 75.8
Room_5003 kitchen 11 PL2	AutoSized - 2063	0	0	1	n.a. / 139.2
Room_5002 kitchen 12 PL	AutoSized - 7342	0	0	1	n.a. / 495.6
Room_5001 rest 9	AutoSized - 3299	0	0	1	n.a. / 222.7
Room_5000 bar 16	AutoSized - 12158	0	0	1	n.a. / 820.7
Room_4778 wtrprk	AutoSized - 2207	0	0	1	n.a. / 149.0
Room_4779 wtrprk	AutoSized - 2253	0	0	1	n.a. / 152.1
Room_4780 wtrprk	AutoSized - 2112	0	0	1	n.a. / 142.5
Room_4781 wtrprk	AutoSized - 2159	0	0	1	n.a. / 145.8
Room_4782 wtrprk PL	AutoSized - 15489	0	0	1	n.a. / 1045.5
Room_8002 mech	AutoSized - 1075	0	0	1	n.a.
Room_8003 mech	AutoSized - 19163	0	0	1	n.a.

Alternative B: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_7023 office 51	AutoSized - 5835	0	0	0.3	n.a. / 393.8
Room_8011 BOH 50	AutoSized - 715	0	0	0.3	n.a. / 48.3
Room_8012 BOH 50	AutoSized - 4873	0	0	0.3	n.a. / 329.0
Room_8013 BOH 50	AutoSized - 3246	0	0	0.3	n.a. / 219.1
Room_8014 BOH 50	AutoSized - 680	0	0	0.3	n.a. / 45.9
Room_8015 BOH 50	AutoSized - 1860	0	0	0.3	n.a. / 125.5
Room_9001 uncond	unconditioned	0	0	0.3	n.a.
Room_9002 ph1 garage PL	unconditioned	0	0	0.3	n.a.
Room_9003 garage 2	unconditioned	0	0	0.3	n.a.
Room_9005 loading	unconditioned	0	0	0.3	n.a.
Room_6000 casino slots	AutoSized - 222486	0	0	0.3	n.a. / 15017.8
Room_6004 casino cs	AutoSized - 13618	0	0	0.3	n.a. / 919.2
Room_6001 casino	AutoSized - 5536	0	0	0.3	n.a. / 373.7
Room_6002 casino	AutoSized - 9724	0	0	0.3	n.a. / 656.4
Room_5020 restaurant 48	AutoSized - 5762	0	0	0.3	n.a. / 389.0
Room_5019 restaurant 48	AutoSized - 3691	0	0	0.3	n.a. / 249.2
Room_5018 restaurant 48	AutoSized - 3115	0	0	0.3	n.a. / 210.3
Room_5017 restaurant 48	AutoSized - 5156	0	0	0.3	n.a. / 348.0
Room_5016 kitchen 49	AutoSized - 3924	0	0	0.3	n.a. / 264.9
Room_5008 food court 13	AutoSized - 7676	0	0	0.3	n.a. / 518.1
Room_5007 buffet 10	AutoSized - 16417	0	0	0.3	n.a. / 1108.1
Room_5006 dining 9	AutoSized - 4466	0	0	0.3	n.a. / 301.4
Room_5005 kitchen 11	AutoSized - 8389	0	0	0.3	n.a. / 566.2
Room_5004 kitchen 11	AutoSized - 1080	0	0	0.3	n.a. / 72.9
Room_5003 kitchen 11 PL2	AutoSized - 1999	0	0	0.3	n.a. / 134.9
Room_5002 kitchen 12 PL	AutoSized - 7099	0	0	0.3	n.a. / 479.2
Room_5001 rest 9	AutoSized - 3202	0	0	0.3	n.a. / 216.2
Room_5000 bar 16	AutoSized - 11776	0	0	0.3	n.a. / 794.9
Room_4778 wtrprk	AutoSized - 2053	0	0	0.3	n.a. / 138.6
Room_4779 wtrprk	AutoSized - 2091	0	0	0.3	n.a. / 141.2
Room_4780 wtrprk	AutoSized - 2007	0	0	0.3	n.a. / 135.5
Room_4781 wtrprk	AutoSized - 2013	0	0	0.3	n.a. / 135.9
Room_4782 wtrprk PL	AutoSized - 14919	0	0	0.3	n.a. / 1007.0
Room_8002 mech	AutoSized - 1039	0	0	0.3	n.a.

Alternative B: Base Case

Room_8004 mech	AutoSized - 3608	0	0	1	n.a.
Room_8005 mech 14	AutoSized - 680	0	0	1	n.a.
Room_1000 corr 45-46	AutoSized - 26531	0	0	0.3	n.a. / 1790.8
Room_1007 warehouse 4	AutoSized - 20862	0	0	0.3	n.a. / 1408.2
Room_1009 lobby 15	AutoSized - 10897	0	0	0.3	n.a. / 735.5
Room_1015 BOH 3	AutoSized - 10426	0	0	0.3	n.a. / 703.7
Room_1016 warehouse	AutoSized - 17585	0	0	0.3	n.a. / 1187.0
Room_1017 BOH 40	AutoSized - 2625	0	0	0.3	n.a. / 177.2
Room_1018 BOH 40	AutoSized - 2175	0	0	0.3	n.a. / 146.8
Room_0135 htl ph4	AutoSized - 5710	0	0	1	n.a.
Room_0136 htl ph4	AutoSized - 1111	0	0	1	n.a.
Room_0137 htl ph4	AutoSized - 5707	0	0	1	n.a.
Room_0138 htl ph4	AutoSized - 5285	0	0	1	n.a.
Room_0139 htl ph4	AutoSized - 1369	0	0	1	n.a.
Kitchen MAU	AutoSized - 50000	0	0	1	n.a. / 3375.0

Outside Air

Name	Total Flow (cfm)	Flow(cfm)/Person	Air change/hour	Fraction Supply Air
Room_6005 toilet 17	n.a.	17	n.a.	n.a.
Room_7000 office 17	n.a.	17	n.a.	n.a.
Room_7001 office 8	n.a.	17	n.a.	n.a.
Room_7002 office 8	n.a.	17	n.a.	n.a.
Room_7003 office 6	n.a.	17	n.a.	n.a.
Room_7004 office 5	n.a.	17	n.a.	n.a.
Room_7005 office 5	n.a.	17	n.a.	n.a.
Room_7006 office 6	n.a.	17	n.a.	n.a.
Room_7007 office 5	n.a.	17	n.a.	n.a.
Room_7008 office 6	n.a.	17	n.a.	n.a.
Room_7009 office 5	n.a.	17	n.a.	n.a.
Room_7011 corr 14	n.a.	17	n.a.	n.a.
Room_7012 locker 7	n.a.	17	n.a.	n.a.
Room_7014 office 1	n.a.	17	n.a.	n.a.
Room_7015 office 2	n.a.	17	n.a.	n.a.
Room_7016 storage	n.a.	17	n.a.	n.a.
Room_7017 office 2	n.a.	17	n.a.	n.a.
Room_7018 Office 52	n.a.	17	n.a.	n.a.
Room_7019 office 52	n.a.	17	n.a.	n.a.
Room_7020 office 52	n.a.	17	n.a.	n.a.
Room_7021 office 52	n.a.	17	n.a.	n.a.
Room_7022 office 14	n.a.	17	n.a.	n.a.
Room_7023 office 51	n.a.	17	n.a.	n.a.
Room_9001 uncond	unconditioned	15	n.a.	n.a.
Room_9002 ph1 garage PL	unconditioned	15	n.a.	n.a.
Room_9003 garage 2	unconditioned	15	n.a.	n.a.
Room_9005 loading	unconditioned	15	n.a.	n.a.
Room_8015 BOH 50	n.a.	17	n.a.	n.a.
Room_8014 BOH 50	n.a.	17	n.a.	n.a.
Room_8013 BOH 50	n.a.	17	n.a.	n.a.
Room_8012 BOH 50	n.a.	17	n.a.	n.a.
Room_8011 BOH 50	n.a.	17	n.a.	n.a.
Room_6000 casino slots	n.a.	9	n.a.	n.a.
Room_6004 casino cs	n.a.	10	n.a.	n.a.

Alternative B: Mitigated Case

Room_8003 mech	AutoSized - 18246	0	0	0.3	n.a.
Room_8004 mech	AutoSized - 3471	0	0	0.3	n.a.
Room_8005 mech 14	AutoSized - 602	0	0	0.3	n.a.
Room_1000 corr 45-46	AutoSized - 25940	0	0	0.3	n.a. / 1751.0
Room_1007 warehouse 4	AutoSized - 20101	0	0	0.3	n.a. / 1356.8
Room_1009 lobby 15	AutoSized - 10586	0	0	0.3	n.a. / 714.6
Room_1015 BOH 3	AutoSized - 10098	0	0	0.3	n.a. / 681.6
Room_1016 warehouse	AutoSized - 16960	0	0	0.3	n.a. / 1144.8
Room_1017 BOH 40	AutoSized - 2538	0	0	0.3	n.a. / 171.3
Room_1018 BOH 40	AutoSized - 2079	0	0	0.3	n.a. / 140.3
Room_0135 htl ph4	AutoSized - 5385	0	0	1	226.2 / 290.2
Room_0136 htl ph4	AutoSized - 1070	0	0	1	43.2 / 53.5
Room_0137 htl ph4	AutoSized - 5577	0	0	1	223.7 / 275.9
Room_0138 htl ph4	AutoSized - 5161	0	0	1	207.6 / 256.7
Room_0139 htl ph4	AutoSized - 1334	0	0	1	53.2 / 65.6
Kitchen MAU	AutoSized - 50000	0	0	1	n.a. / 3375.0

Outside Air

Name	Total Flow (cfm)	Flow(cfm)/Person	Air change/hour	Fraction Supply Air
Room_6005 toilet 17	n.a.	17	n.a.	n.a.
Room_7000 office 17	n.a.	17	n.a.	n.a.
Room_7001 office 8	n.a.	17	n.a.	n.a.
Room_7002 office 8	n.a.	17	n.a.	n.a.
Room_7003 office 6	n.a.	17	n.a.	n.a.
Room_7004 office 5	n.a.	17	n.a.	n.a.
Room_7005 office 5	n.a.	17	n.a.	n.a.
Room_7006 office 6	n.a.	17	n.a.	n.a.
Room_7007 office 5	n.a.	17	n.a.	n.a.
Room_7008 office 6	n.a.	17	n.a.	n.a.
Room_7009 office 5	n.a.	17	n.a.	n.a.
Room_7011 corr 14	n.a.	17	n.a.	n.a.
Room_7012 locker 7	n.a.	17	n.a.	n.a.
Room_7014 office 1	n.a.	17	n.a.	n.a.
Room_7015 office 2	n.a.	17	n.a.	n.a.
Room_7016 storage	n.a.	17	n.a.	n.a.
Room_7017 office 2	n.a.	17	n.a.	n.a.
Room_7018 Office 52	n.a.	17	n.a.	n.a.
Room_7019 office 52	n.a.	17	n.a.	n.a.
Room_7020 office 52	n.a.	17	n.a.	n.a.
Room_7021 office 52	n.a.	17	n.a.	n.a.
Room_7022 office 14	n.a.	17	n.a.	n.a.
Room_7023 office 51	n.a.	17	n.a.	n.a.
Room_8011 BOH 50	n.a.	17	n.a.	n.a.
Room_8012 BOH 50	n.a.	17	n.a.	n.a.
Room_8013 BOH 50	n.a.	17	n.a.	n.a.
Room_8014 BOH 50	n.a.	17	n.a.	n.a.
Room_8015 BOH 50	n.a.	17	n.a.	n.a.
Room_9001 uncond	unconditioned	15	n.a.	n.a.
Room_9002 ph1 garage PL	unconditioned	15	n.a.	n.a.
Room_9003 garage 2	unconditioned	15	n.a.	n.a.
Room_9005 loading	unconditioned	15	n.a.	n.a.

Alternative B: Base Case

Room_6001 casino	n.a.	9	n.a.	n.a.
Room_6002 casino	n.a.	9	n.a.	n.a.
Room_5020 restaurant 48	n.a.	10	n.a.	n.a.
Room_5019 restaurant 48	n.a.	10	n.a.	n.a.
Room_5018 restaurant 48	n.a.	10	n.a.	n.a.
Room_5017 restaurant 48	n.a.	10	n.a.	n.a.
Room_5016 kitchen 49	n.a.	10	n.a.	n.a.
Room_5008 food court 13	n.a.	10	n.a.	n.a.
Room_5007 buffet 10	n.a.	10	n.a.	n.a.
Room_5006 dining 9	n.a.	10	n.a.	n.a.
Room_5005 kitchen 11	n.a.	10	n.a.	n.a.
Room_5004 kitchen 11	n.a.	10	n.a.	n.a.
Room_5003 kitchen 11 PL2	n.a.	10	n.a.	n.a.
Room_5002 kitchen 12 PL	n.a.	10	n.a.	n.a.
Room_5001 rest 9	n.a.	10	n.a.	n.a.
Room_5000 bar 16	n.a.	10	n.a.	n.a.
Room_4778 wtrprk	n.a.	10	n.a.	n.a.
Room_4779 wtrprk	n.a.	10	n.a.	n.a.
Room_4780 wtrprk	n.a.	10	n.a.	n.a.
Room_4781 wtrprk	n.a.	10	n.a.	n.a.
Room_4782 wtrprk PL	n.a.	10	n.a.	n.a.
Room_8002 mech	n.a.	15	n.a.	n.a.
Room_8003 mech	n.a.	15	n.a.	n.a.
Room_8004 mech	n.a.	15	n.a.	n.a.
Room_8005 mech 14	n.a.	15	n.a.	n.a.
Room_1000 corr 45-46	n.a.	17	n.a.	n.a.
Room_1007 warehouse 4	n.a.	17	n.a.	n.a.
Room_1009 lobby 15	n.a.	17	n.a.	n.a.
Room_1015 BOH 3	n.a.	17	n.a.	n.a.
Room_1016 warehouse	n.a.	17	n.a.	n.a.
Room_1017 BOH 40	n.a.	17	n.a.	n.a.
Room_1018 BOH 40	n.a.	17	n.a.	n.a.
Room_0135 htl ph4	n.a.	11	n.a.	n.a.
Room_0136 htl ph4	n.a.	11	n.a.	n.a.
Room_0137 htl ph4	n.a.	11	n.a.	n.a.
Room_0138 htl ph4	n.a.	11	n.a.	n.a.
Room_0139 htl ph4	n.a.	11	n.a.	n.a.
Kitchen MAU	50000	n.a.	n.a.	n.a.

Zone Thermostat and Terminal Box

	Thermostat		PIU		
Name	Type	Throttling Range (°F)	Type	Zone Fan Volume (cfm)	Fan Power (W)
Room_6005 toilet 17	Reverse Action	4	No PIU	n.a.	n.a.
Room_7000 office 17	Reverse Action	4	No PIU	n.a.	n.a.
Room_7001 office 8	Reverse Action	4	No PIU	n.a.	n.a.
Room_7002 office 8	Reverse Action	4	No PIU	n.a.	n.a.
Room_7003 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7004 office 5	Reverse Action	4	No PIU	n.a.	n.a.

Alternative B: Mitigated Case

Room_6000 casino slots	n.a.	9	n.a.	n.a.
Room_6004 casino cs	n.a.	10	n.a.	n.a.
Room_6001 casino	n.a.	9	n.a.	n.a.
Room_6002 casino	n.a.	9	n.a.	n.a.
Room_5020 restaurant 48	n.a.	10	n.a.	n.a.
Room_5019 restaurant 48	n.a.	10	n.a.	n.a.
Room_5018 restaurant 48	n.a.	10	n.a.	n.a.
Room_5017 restaurant 48	n.a.	10	n.a.	n.a.
Room_5016 kitchen 49	n.a.	10	n.a.	n.a.
Room_5008 food court 13	n.a.	10	n.a.	n.a.
Room_5007 buffet 10	n.a.	10	n.a.	n.a.
Room_5006 dining 9	n.a.	10	n.a.	n.a.
Room_5005 kitchen 11	n.a.	10	n.a.	n.a.
Room_5004 kitchen 11	n.a.	10	n.a.	n.a.
Room_5003 kitchen 11 PL2	n.a.	10	n.a.	n.a.
Room_5002 kitchen 12 PL	n.a.	10	n.a.	n.a.
Room_5001 rest 9	n.a.	10	n.a.	n.a.
Room_5000 bar 16	n.a.	10	n.a.	n.a.
Room_4778 wtrprk	n.a.	10	n.a.	n.a.
Room_4779 wtrprk	n.a.	10	n.a.	n.a.
Room_4780 wtrprk	n.a.	10	n.a.	n.a.
Room_4781 wtrprk	n.a.	10	n.a.	n.a.
Room_4782 wtrprk PL	n.a.	10	n.a.	n.a.
Room_8002 mech	n.a.	15	n.a.	n.a.
Room_8003 mech	n.a.	15	n.a.	n.a.
Room_8004 mech	n.a.	15	n.a.	n.a.
Room_8005 mech 14	n.a.	15	n.a.	n.a.
Room_1000 corr 45-46	n.a.	17	n.a.	n.a.
Room_1007 warehouse 4	n.a.	17	n.a.	n.a.
Room_1009 lobby 15	n.a.	17	n.a.	n.a.
Room_1015 BOH 3	n.a.	17	n.a.	n.a.
Room_1016 warehouse	n.a.	17	n.a.	n.a.
Room_1017 BOH 40	n.a.	17	n.a.	n.a.
Room_1018 BOH 40	n.a.	17	n.a.	n.a.
Room_0135 htl ph4	n.a.	11	n.a.	n.a.
Room_0136 htl ph4	n.a.	11	n.a.	n.a.
Room_0137 htl ph4	n.a.	11	n.a.	n.a.
Room_0138 htl ph4	n.a.	11	n.a.	n.a.
Room_0139 htl ph4	n.a.	11	n.a.	n.a.
Kitchen MAU	50000	n.a.	n.a.	n.a.

Zone Thermostat and Terminal Box

	Thermostat		PIU		
Name	Type	Throttling Range (°F)	Type	Zone Fan Volume (cfm)	Fan Power (W)
Room_6005 toilet 17	Reverse Action	4	No PIU	n.a.	n.a.
Room_7000 office 17	Reverse Action	4	No PIU	n.a.	n.a.
Room_7001 office 8	Reverse Action	4	No PIU	n.a.	n.a.
Room_7002 office 8	Reverse Action	4	No PIU	n.a.	n.a.

Alternative B: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_7005 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7006 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7007 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7008 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7009 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7011 corr 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_7012 locker 7	Reverse Action	4	No PIU	n.a.	n.a.
Room_7014 office 1	Reverse Action	4	No PIU	n.a.	n.a.
Room_7015 office 2	Reverse Action	4	No PIU	n.a.	n.a.
Room_7016 storage	Reverse Action	4	No PIU	n.a.	n.a.
Room_7017 office 2	Reverse Action	4	No PIU	n.a.	n.a.
Room_7018 Office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7019 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7020 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7021 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7022 office 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_7023 office 51	Reverse Action	4	No PIU	n.a.	n.a.
Room_8015 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8014 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8013 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8012 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8011 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_6000 casino slots	Reverse Action	4	No PIU	n.a.	n.a.
Room_6004 casino cs	Reverse Action	4	No PIU	n.a.	n.a.
Room_6001 casino	Reverse Action	4	No PIU	n.a.	n.a.
Room_6002 casino	Reverse Action	4	No PIU	n.a.	n.a.
Room_5020 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5019 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5018 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5017 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5016 kitchen 49	Reverse Action	4	No PIU	n.a.	n.a.
Room_5008 food court 13	Reverse Action	4	No PIU	n.a.	n.a.
Room_5007 buffet 10	Reverse Action	4	No PIU	n.a.	n.a.
Room_5006 dining 9	Reverse Action	4	No PIU	n.a.	n.a.

Alternative B: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_7003 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7004 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7005 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7006 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7007 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7008 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7009 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7011 corr 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_7012 locker 7	Reverse Action	4	No PIU	n.a.	n.a.
Room_7014 office 1	Reverse Action	4	No PIU	n.a.	n.a.
Room_7015 office 2	Reverse Action	4	No PIU	n.a.	n.a.
Room_7016 storage	Reverse Action	4	No PIU	n.a.	n.a.
Room_7017 office 2	Reverse Action	4	No PIU	n.a.	n.a.
Room_7018 Office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7019 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7020 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7021 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7022 office 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_7023 office 51	Reverse Action	4	No PIU	n.a.	n.a.
Room_8011 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8012 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8013 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8014 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8015 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_6000 casino slots	Reverse Action	4	No PIU	n.a.	n.a.
Room_6004 casino cs	Reverse Action	4	No PIU	n.a.	n.a.
Room_6001 casino	Reverse Action	4	No PIU	n.a.	n.a.
Room_6002 casino	Reverse Action	4	No PIU	n.a.	n.a.
Room_5020 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5019 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5018 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5017 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5016 kitchen 49	Reverse Action	4	No PIU	n.a.	n.a.
Room_5008 food court 13	Reverse Action	4	No PIU	n.a.	n.a.

Alternative B: Base Case

Room_5005 kitchen 11	Reverse Action	4	No PIU	n.a.	n.a.
Room_5004 kitchen 11	Reverse Action	4	No PIU	n.a.	n.a.
Room_5003 kitchen 11 PL2	Reverse Action	4	No PIU	n.a.	n.a.
Room_5002 kitchen 12 PL	Reverse Action	4	No PIU	n.a.	n.a.
Room_5001 rest 9	Reverse Action	4	No PIU	n.a.	n.a.
Room_5000 bar 16	Reverse Action	4	No PIU	n.a.	n.a.
Room_4778 wtrprk	Reverse Action	4	No PIU	n.a.	n.a.
Room_4779 wtrprk	Reverse Action	4	No PIU	n.a.	n.a.
Room_4780 wtrprk	Reverse Action	4	No PIU	n.a.	n.a.
Room_4781 wtrprk	Reverse Action	4	No PIU	n.a.	n.a.
Room_4782 wtrprk PL	Reverse Action	4	No PIU	n.a.	n.a.
Room_8002 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8003 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8004 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8005 mech 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_1000 corr 45-46	Reverse Action	4	No PIU	n.a.	n.a.
Room_1007 warehouse 4	Reverse Action	4	No PIU	n.a.	n.a.
Room_1009 lobby 15	Reverse Action	4	No PIU	n.a.	n.a.
Room_1015 BOH 3	Reverse Action	4	No PIU	n.a.	n.a.
Room_1016 warehouse	Reverse Action	4	No PIU	n.a.	n.a.
Room_1017 BOH 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_1018 BOH 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_0135 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_0136 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_0137 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_0138 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_0139 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Kitchen MAU	Reverse Action	4	No PIU	n.a.	n.a.

Zone Heating

	Zone Reheat		Baseboards	
Name	Reheat Delta-T (°F)	Heat Source	Rating (kBtu/hr)	Control
Room_6005 toilet 17	50	Hot Water from Plant	n.a.	n.a.
Room_7000 office 17	50	Hot Water from Plant	n.a.	n.a.
Room_7001 office 8	50	Hot Water from Plant	n.a.	n.a.
Room_7002 office 8	50	Hot Water from Plant	n.a.	n.a.
Room_7003 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7004 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7005 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7006 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7007 office 5	50	Hot Water from Plant	n.a.	n.a.

Alternative B: Mitigated Case

Room_5007 buffet 10	Reverse Action	4	No PIU	n.a.	n.a.
Room_5006 dining 9	Reverse Action	4	No PIU	n.a.	n.a.
Room_5005 kitchen 11	Reverse Action	4	No PIU	n.a.	n.a.
Room_5004 kitchen 11	Reverse Action	4	No PIU	n.a.	n.a.
Room_5003 kitchen 11 PL2	Reverse Action	4	No PIU	n.a.	n.a.
Room_5002 kitchen 12 PL	Reverse Action	4	No PIU	n.a.	n.a.
Room_5001 rest 9	Reverse Action	4	No PIU	n.a.	n.a.
Room_5000 bar 16	Reverse Action	4	No PIU	n.a.	n.a.
Room_4778 wtrprk	Reverse Action	4	No PIU	n.a.	n.a.
Room_4779 wtrprk	Reverse Action	4	No PIU	n.a.	n.a.
Room_4780 wtrprk	Reverse Action	4	No PIU	n.a.	n.a.
Room_4781 wtrprk	Reverse Action	4	No PIU	n.a.	n.a.
Room_4782 wtrprk PL	Reverse Action	4	No PIU	n.a.	n.a.
Room_8002 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8003 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8004 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8005 mech 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_1000 corr 45-46	Reverse Action	4	No PIU	n.a.	n.a.
Room_1007 warehouse 4	Reverse Action	4	No PIU	n.a.	n.a.
Room_1009 lobby 15	Reverse Action	4	No PIU	n.a.	n.a.
Room_1015 BOH 3	Reverse Action	4	No PIU	n.a.	n.a.
Room_1016 warehouse	Reverse Action	4	No PIU	n.a.	n.a.
Room_1017 BOH 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_1018 BOH 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_0135 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_0136 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_0137 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_0138 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Room_0139 htl ph4	Reverse Action	4	No PIU	n.a.	n.a.
Kitchen MAU	Reverse Action	4	No PIU	n.a.	n.a.

Zone Heating

	Zone Reheat		Baseboards	
Name	Reheat Delta-T (°F)	Heat Source	Rating (kBtu/hr)	Control
Room_6005 toilet 17	50	Hot Water from Plant	n.a.	n.a.
Room_7000 office 17	50	Hot Water from Plant	n.a.	n.a.
Room_7001 office 8	50	Hot Water from Plant	n.a.	n.a.
Room_7002 office 8	50	Hot Water from Plant	n.a.	n.a.
Room_7003 office 6	50	Hot Water from Plant	n.a.	n.a.

Alternative B: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_7008 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7009 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7011 corr 14	50	Hot Water from Plant	n.a.	n.a.
Room_7012 locker 7	50	Hot Water from Plant	n.a.	n.a.
Room_7014 office 1	50	Hot Water from Plant	n.a.	n.a.
Room_7015 office 2	50	Hot Water from Plant	n.a.	n.a.
Room_7016 storage	50	Hot Water from Plant	n.a.	n.a.
Room_7017 office 2	50	Hot Water from Plant	n.a.	n.a.
Room_7018 Office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7019 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7020 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7021 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7022 office 14	50	Hot Water from Plant	n.a.	n.a.
Room_7023 office 51	50	Hot Water from Plant	n.a.	n.a.
Room_8015 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8014 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8013 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8012 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8011 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_6000 casino slots	50	Hot Water from Plant	n.a.	n.a.
Room_6004 casino cs	50	Hot Water from Plant	n.a.	n.a.
Room_6001 casino	50	Hot Water from Plant	n.a.	n.a.
Room_6002 casino	50	Hot Water from Plant	n.a.	n.a.
Room_5020 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5019 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5018 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5017 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5016 kitchen 49	50	Hot Water from Plant	n.a.	n.a.
Room_5008 food court 13	50	Hot Water from Plant	n.a.	n.a.
Room_5007 buffet 10	50	Hot Water from Plant	n.a.	n.a.
Room_5006 dining 9	50	Hot Water from Plant	n.a.	n.a.
Room_5005 kitchen 11	50	Hot Water from Plant	n.a.	n.a.
Room_5004 kitchen 11	50	Hot Water from Plant	n.a.	n.a.
Room_5003 kitchen 11 PL2	50	Hot Water from Plant	n.a.	n.a.
Room_5002 kitchen 12 PL	50	Hot Water from Plant	n.a.	n.a.
Room_5001 rest 9	50	Hot Water from Plant	n.a.	n.a.
Room_5000 bar 16	50	Hot Water from Plant	n.a.	n.a.
Room_4778 wtrprk	50	Hot Water from Plant	n.a.	n.a.
Room_4779 wtrprk	50	Hot Water from Plant	n.a.	n.a.
Room_4780 wtrprk	50	Hot Water from Plant	n.a.	n.a.
Room_4781 wtrprk	50	Hot Water from Plant	n.a.	n.a.
Room_4782 wtrprk PL	50	Hot Water from Plant	n.a.	n.a.
Room_8002 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8003 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8004 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8005 mech 14	50	Hot Water from Plant	n.a.	n.a.
Room_1000 corr 45-46	50	Hot Water from Plant	n.a.	n.a.
Room_1007 warehouse 4	50	Hot Water from Plant	n.a.	n.a.
Room_1009 lobby 15	50	Hot Water from Plant	n.a.	n.a.
Room_1015 BOH 3	50	Hot Water from Plant	n.a.	n.a.
Room_1016 warehouse	50	Hot Water from Plant	n.a.	n.a.
Room_1017 BOH 40	50	Hot Water from Plant	n.a.	n.a.
Room_1018 BOH 40	50	Hot Water from Plant	n.a.	n.a.
Kitchen MAU	50	Hot Water from Plant	n.a.	n.a.

Alternative B: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_7004 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7005 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7006 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7007 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7008 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7009 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7011 corr 14	50	Hot Water from Plant	n.a.	n.a.
Room_7012 locker 7	50	Hot Water from Plant	n.a.	n.a.
Room_7014 office 1	50	Hot Water from Plant	n.a.	n.a.
Room_7015 office 2	50	Hot Water from Plant	n.a.	n.a.
Room_7016 storage	50	Hot Water from Plant	n.a.	n.a.
Room_7017 office 2	50	Hot Water from Plant	n.a.	n.a.
Room_7018 Office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7019 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7020 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7021 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7022 office 14	50	Hot Water from Plant	n.a.	n.a.
Room_7023 office 51	50	Hot Water from Plant	n.a.	n.a.
Room_8011 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8012 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8013 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8014 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8015 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_6000 casino slots	50	Hot Water from Plant	n.a.	n.a.
Room_6004 casino cs	50	Hot Water from Plant	n.a.	n.a.
Room_6001 casino	50	Hot Water from Plant	n.a.	n.a.
Room_6002 casino	50	Hot Water from Plant	n.a.	n.a.
Room_5020 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5019 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5018 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5017 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5016 kitchen 49	50	Hot Water from Plant	n.a.	n.a.
Room_5008 food court 13	50	Hot Water from Plant	n.a.	n.a.
Room_5007 buffet 10	50	Hot Water from Plant	n.a.	n.a.
Room_5006 dining 9	50	Hot Water from Plant	n.a.	n.a.
Room_5005 kitchen 11	50	Hot Water from Plant	n.a.	n.a.
Room_5004 kitchen 11	50	Hot Water from Plant	n.a.	n.a.
Room_5003 kitchen 11 PL2	50	Hot Water from Plant	n.a.	n.a.
Room_5002 kitchen 12 PL	50	Hot Water from Plant	n.a.	n.a.
Room_5001 rest 9	50	Hot Water from Plant	n.a.	n.a.
Room_5000 bar 16	50	Hot Water from Plant	n.a.	n.a.
Room_4778 wtrprk	50	Hot Water from Plant	n.a.	n.a.
Room_4779 wtrprk	50	Hot Water from Plant	n.a.	n.a.
Room_4780 wtrprk	50	Hot Water from Plant	n.a.	n.a.
Room_4781 wtrprk	50	Hot Water from Plant	n.a.	n.a.
Room_4782 wtrprk PL	50	Hot Water from Plant	n.a.	n.a.
Room_8002 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8003 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8004 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8005 mech 14	50	Hot Water from Plant	n.a.	n.a.
Room_1000 corr 45-46	50	Hot Water from Plant	n.a.	n.a.
Room_1007 warehouse 4	50	Hot Water from Plant	n.a.	n.a.
Room_1009 lobby 15	50	Hot Water from Plant	n.a.	n.a.
Room_1015 BOH 3	50	Hot Water from Plant	n.a.	n.a.
Room_1016 warehouse	50	Hot Water from Plant	n.a.	n.a.
Room_1017 BOH 40	50	Hot Water from Plant	n.a.	n.a.
Room_1018 BOH 40	50	Hot Water from Plant	n.a.	n.a.
Kitchen MAU	50	Hot Water from Plant	n.a.	n.a.

Alternative B: Base Case

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt B Base Case
Case Description: Phase 1a 4

Chilled Water Temperature 44 °F

Chilled Water Pumps

Type	Variable-Speed
Head (ft)	75
Motor Efficiency	0.65
Impeller Efficiency	1

Hot Water Pump

Type	Variable-Speed
Head (ft)	60
Motor Efficiency	1
Impeller Efficiency	0.6

Cooling Tower (Central Plant)

Type	Open
Efficiency (bhp/tons)	0.017
Approach Temperature	8 °F
Design Wetbulb Temperature	78 °F
Design Range	10 °F
Cooling Cap (tons) AutoSized	2442.323
Waterside Economizer	No
Number of Cells	1
Cell Control	Minimum Needed
Temperature Control	Fixed
Setpoint Temperature	85 °F
Throttling Temperature	10 °F
Minimum Water Temperature	55 °F
Capacity Control	Two-Speed Fan
Minimum CFM Ratio	0.5
Minimum Power Ratio	0.16

Chiller Type #1: Centrifugal

Condenser Type	Water-cooled
Chiller Autosized	Yes
Hot Gas ByPass	No
Min. Operating Point	0.2144
Rated Efficiency	0.576 (kW/ton)
Rated CHWS	44 °F
Rated Condition CWS	85 °F
Evap. Flow	2.4 (gpm/ton)
Evap. Pressure Drop	0 (ft)
Evap. Imp. Eff.	1
Evap. Motor Eff.	1
Cond. Flow	2.78 (gpm/ton)
Cond. Pressure Drop	60 (ft)
Cond. Imp. Eff.	1
Cond. Motor Eff.	0.6
Number Installed	1
AutoSized	1987.289 (tons)

Alternative B: Mitigated Case

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt B Design Case
Case Description: Phase 1a 4

Chilled Water Temperature 42 °F

Chilled Water Pumps

Type	Variable-Speed
Head (ft)	75
Motor Efficiency	1
Impeller Efficiency	0.65

Hot Water Pump

Type	Variable-Speed
Head (ft)	60
Motor Efficiency	1
Impeller Efficiency	0.65

Cooling Tower (Central Plant)

Type	Open
Efficiency (bhp/tons)	0.013
Approach Temperature	8 °F
Design Wetbulb Temperature	78 °F
Design Range	15 °F
Cooling Cap (tons) AutoSized	4612.898
Waterside Economizer	No
Number of Cells	5
Cell Control	Minimum Needed
Temperature Control	Fixed
Setpoint Temperature	85 °F
Throttling Temperature	15 °F
Minimum Water Temperature	55 °F
Capacity Control	Variable Speed Fan
Minimum Fan Speed	0.5

Chiller Type #1: Centrifugal

Condenser Type	Water-cooled
Chiller Autosized	No
Hot Gas ByPass	No
Min. Operating Point	0.2144
Rated Efficiency	0.52 (kW/ton)
Rated CHWS	44 °F
Rated Condition CWS	85 °F
Evap. Flow	1.7 (gpm/ton)
Evap. Pressure Drop	0 (ft)
Evap. Imp. Eff.	1
Evap. Motor Eff.	1
Cond. Flow	2.75 (gpm/ton)
Cond. Pressure Drop	60 (ft)
Cond. Imp. Eff.	1
Cond. Motor Eff.	0.6
Number Installed	5
Size #1	800.0 (tons)
Size #2	800.0 (tons)
Size #3	800.0 (tons)
Size #4	800.0 (tons)
Size #5	800.0 (tons)

Alternative B: Base Case

Fuel Boiler Type #1: Fuel Hot Water w/ Atmospheric Burner

Boiler Autosized	Yes
Number Installed	1
Boiler Efficiency	0.8
Min. Operating Point	0.5
Max. Operating Point	1
AutoSized	15.627 MBtu/h

Alternative B: Mitigated Case

Fuel Boiler Type #1: Fuel Hot Water w/ Atmospheric Burner

Boiler Autosized	Yes
Number Installed	1
Boiler Efficiency	0.85
Min. Operating Point	0.5
Max. Operating Point	1
AutoSized	15.781 MBtu/h

Alternative B: Base Case

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt B Base Case
Case Description: Phase 1a 4
Number of Systems: 13

Systems Summary

Name	Type	Conditioned Area (ft²)	Supply Air (CFM)	Min. OA Ratio	Cooling Cap (kBtu/h)	Heating Cap (kBtu/h)	Cooling Peak (kBtu/h)	Heating Peak (kBtu/h)	Cooling Energy (MBtu)	Heating Energy (MBtu)
AHU Office	VAVS	159780	167125	0.081	8503	0	3412.6	1627.8	6476.3	758.3
AHU Slots	VAVS	73898	245580	0.2	13777.1	0	10678.1	469.7	28544	2182.1
AHU Tables	VAVS	1962	9705	0.2	535.5	0	374.6	44.1	656.7	1.4
AHU Restaurant	VAVS	53767	86104	0.446	4984.2	1691.5	4041.7	2898.7	4834.4	1363.5
AHU Water Park	PVAVS	25600	24220	0.211	1183.5	0	745.8	429.6	867.3	131.9
FCU Mech	VAVS	28669	24526	0.064	1224.6	0	491.8	0	2840.3	0
AHU Assembly	VAVS	81729	91099	0.508	5280	2406.4	3456.5	5728.9	2885.4	2988.2
System_38091	PSZ	88200	68519	0.071	2268.8	3666.5	738.9	322.5	1544.4	227.8
System_38092	PSZ	9000	13330	0.037	406.8	665.6	212.1	218.3	221.1	401.9
System_38093	PSZ	40578	68484	0.033	2054.5	3387	1087	815.8	1503.6	1127.6
System_38094	PSZ	40476	63419	0.035	1921.8	3153.3	1041.7	847.7	1124.1	1443.5
System_38095	PSZ	9010	16429	0.03	488.8	808.3	254.1	194.1	378.4	254.8
AHU MAU Ph1	RHFS	1	50000	1	2668.4	0	3714.6	3143	4286.2	8708.9

Systems Summary per Conditioned Area

Name	Type	Conditioned Area (ft²)	Supply Air (CFM/ft²)	Min. OA Ratio	Cooling Cap (Btu/h/ft²)	Heating Cap (Btu/h/ft²)	Cooling Peak (Btu/h/ft²)	Heating Peak (Btu/h/ft²)	Cooling Energy (kBtu/ft²)	Heating Energy (kBtu/ft²)
AHU Office	VAVS	159780	1.046	0.081	53	0	21	10	40.5	4.7
AHU Slots	VAVS	73898	3.323	0.2	186	0	144	6	386.3	29.5
AHU Tables	VAVS	1962	4.945	0.2	273	0	191	22	334.6	0.7
AHU Restaurant	VAVS	53767	1.601	0.446	93	31	75	54	89.9	25.4
AHU Water Park	PVAVS	25600	0.946	0.211	46	0	29	17	33.9	5.2
FCU Mech	VAVS	28669	0.855	0.064	43	0	17	0	99.1	0
AHU Assembly	VAVS	81729	1.115	0.508	65	29	42	70	35.3	36.6
System_38091	PSZ	88200	0.777	0.071	26	42	8	4	17.5	2.6
System_38092	PSZ	9000	1.481	0.037	45	74	24	24	24.6	44.7
System_38093	PSZ	40578	1.688	0.033	51	83	27	20	37.1	27.8
System_38094	PSZ	40476	1.567	0.035	47	78	26	21	27.8	35.7
System_38095	PSZ	9010	1.823	0.03	54	90	28	22	42	28.3
AHU MAU Ph1	RHFS	1	50000	1	2668372	0	3714582	3143035	4286243	8708873

Alternative B: Mitigated Case

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt B Design Case
Case Description: Phase 1a 4
Number of Systems: 13

Systems Summary

Name	Type	Conditioned Area (ft²)	Supply Air (CFM)	Min. OA Ratio	Cooling Cap (kBtu/h)	Heating Cap (kBtu/h)	Cooling Peak (kBtu/h)	Heating Peak (kBtu/h)	Cooling Energy (MBtu)	Heating Energy (MBtu)
AHU Office	VAVS	159780	160726	0.085	8213.7	0	3371.4	2366.2	5517	1545.3
AHU Slots	VAVS	73898	241640	0.2	13564.7	0	7602.8	443.2	26664.1	1023.9
AHU Tables	VAVS	1962	9724	0.2	536.5	0	273.2	112	566.9	17
AHU Restaurant	VAVS	53767	83752	0.459	4851.2	1758.4	3672.3	5266.9	3867.6	1245.8
AHU Water Park	VAVS	25600	23083	0.222	1277.1	0	983.9	1365.9	625.5	308.4
FCU Mech	VAVS	28669	23358	0.067	1172.6	0	486	57.5	918.1	0.4
AHU Assembly	VAVS	81729	88303	0.524	5121.3	2488.6	3241.9	5553.1	2712.4	2671.7
System_38091	FPFC	88200	64615	0.075	0	0	849.8	294.9	923.7	35
System_38092	FPFC	9000	12843	0.039	0	0	228.7	220.6	129.4	191
System_38093	FPFC	40578	66926	0.033	0	0	1107.3	737.7	916.8	403.4
System_38094	FPFC	40476	61931	0.036	0	0	844.4	818.5	655	635.4
System_38095	FPFC	9010	16005	0.031	0	0	200.4	182.9	221	92.9
Kitchen MAU	RHFS	1	50000	1	2668.4	0	3714.6	3157.2	4369.7	8886.8

Systems Summary per Conditioned Area

Name	Type	Conditioned Area (ft²)	Supply Air (CFM/ft²)	Min. OA Ratio	Cooling Cap (Btu/h/ft²)	Heating Cap (Btu/h/ft²)	Cooling Peak (Btu/h/ft²)	Heating Peak (Btu/h/ft²)	Cooling Energy (kBtu/ft²)	Heating Energy (kBtu/ft²)
AHU Office	VAVS	159780	1.006	0.085	51	0	21	15	34.5	9.7
AHU Slots	VAVS	73898	3.27	0.2	184	0	103	6	360.8	13.9
AHU Tables	VAVS	1962	4.955	0.2	273	0	139	57	288.9	8.7
AHU Restaurant	VAVS	53767	1.558	0.459	90	33	68	98	71.9	23.2
AHU Water Park	VAVS	25600	0.902	0.222	50	0	38	53	24.4	12
FCU Mech	VAVS	28669	0.815	0.067	41	0	17	2	32	0
AHU Assembly	VAVS	81729	1.08	0.524	63	30	40	68	33.2	32.7
System_38091	FPFC	88200	0.733	0.075	0	0	10	3	10.5	0.4
System_38092	FPFC	9000	1.427	0.039	0	0	25	25	14.4	21.2
System_38093	FPFC	40578	1.649	0.033	0	0	27	18	22.6	9.9
System_38094	FPFC	40476	1.53	0.036	0	0	21	20	16.2	15.7
System_38095	FPFC	9010	1.776	0.031	0	0	22	20	24.5	10.3
Kitchen MAU	RHFS	1	50000	1	2668372	0	3714611	3157236	4369668	8886831

Alternative B: Base Case

Individual System
Name: AHU Office
Type: Variable Air Volume
Occupancy: Office
Control Zone: Room_7001 office 8
Number of Conditioned Zones Served: 28
Total Conditioned Area Served (ft²): 159780.2
Average Air Flow per Conditioned Area (cfm/ft²): 1.05

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	167125

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	8502.99
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Mitigated Case

Individual System
Name: AHU Office
Type: Variable Air Volume
Occupancy: Office
Control Zone: Room_7001 office 8
Number of Conditioned Zones Served: 28
Total Conditioned Area Served (ft²): 159780.2
Average Air Flow per Conditioned Area (cfm/ft²): 1.01

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	160726

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	8213.75
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Base Case

Individual System
Name: AHU Slots
Type: Variable Air Volume
Occupancy: Casino Gaming
Control Zone: Room_6000 casino slots
Number of Conditioned Zones Served: 3
Total Conditioned Area Served (ft²): 73897.8
Average Air Flow per Conditioned Area (cfm/ft²): 3.32

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	245580

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	13777.08
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Mitigated Case

Individual System
Name: AHU Slots
Type: Variable Air Volume
Occupancy: Casino Gaming
Control Zone: Room_6000 casino slots
Number of Conditioned Zones Served: 3
Total Conditioned Area Served (ft²): 73897.8
Average Air Flow per Conditioned Area (cfm/ft²): 3.27

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Heat Recovery

Heat Recovery Effectiveness	80%

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	241640

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	13564.72
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Base Case

Individual System
Name: AHU Tables
Type: Variable Air Volume
Occupancy: Casino Gaming
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 1962.5
Average Air Flow per Conditioned Area (cfm/ft²): 4.95

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	9705

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	535.47
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Mitigated Case

Individual System
Name: AHU Tables
Type: Variable Air Volume
Occupancy: Casino Gaming
Control Zone: Room_6002 casino
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 1962.5
Average Air Flow per Conditioned Area (cfm/ft²): 4.95

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Heat Recovery

Heat Recovery Effectiveness	80%

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	9724

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	536.48
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Base Case

Individual System
Name: AHU Restaurant
Type: Variable Air Volume
Occupancy: Restaurant
Control Zone: Room_5000 bar 16
Number of Conditioned Zones Served: 14
Total Conditioned Area Served (ft²): 53766.7
Average Air Flow per Conditioned Area (cfm/ft²): 1.60

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Autosized Capacity	1691.54
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Constant Volume
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	86104

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	4984.24
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Mitigated Case

Individual System
Name: AHU Restaurant
Type: Variable Air Volume
Occupancy: Restaurant VAV
Control Zone: Room_5000 bar 16
Number of Conditioned Zones Served: 14
Total Conditioned Area Served (ft²): 53766.7
Average Air Flow per Conditioned Area (cfm/ft²): 1.56

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Autosized Capacity	1758.4
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	83752

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	4851.17
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Base Case

Individual System
Name: AHU Water Park
Type: Packaged Variable Air Volume
Occupancy: Assembly
Control Zone: Room_4778 wtrprk
Number of Conditioned Zones Served: 5
Total Conditioned Area Served (ft²): 25600.0
Average Air Flow per Conditioned Area (cfm/ft²): 0.95

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Constant Volume
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	24220

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1183.47
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Mitigated Case

Individual System
Name: AHU Water Park
Type: Variable Air Volume
Occupancy: Assembly
Control Zone: Room_4778 wtrprk
Number of Conditioned Zones Served: 5
Total Conditioned Area Served (ft²): 25600.0
Average Air Flow per Conditioned Area (cfm/ft²): 0.90

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	23083

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1277.09
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Base Case

Individual System
Name: FCU Mech
Type: Variable Air Volume
Occupancy: Office
Number of Conditioned Zones Served: 4
Total Conditioned Area Served (ft²): 28669.3
Average Air Flow per Conditioned Area (cfm/ft²): 0.86

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	24526

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1224.64
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Mitigated Case

Individual System
Name: FCU Mech
Type: Variable Air Volume
Occupancy: Office
Number of Conditioned Zones Served: 4
Total Conditioned Area Served (ft²): 28669.3
Average Air Flow per Conditioned Area (cfm/ft²): 0.81

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	23358

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1172.63
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Base Case

Individual System
Name: AHU Assembly
Type: Variable Air Volume
Occupancy: Assembly
Control Zone: Room_1000 corr 45-46
Number of Conditioned Zones Served: 7
Total Conditioned Area Served (ft²): 81728.8
Average Air Flow per Conditioned Area (cfm/ft²): 1.11

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Autosized Capacity	2406.36
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	91099

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	5279.99
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Mitigated Case

Individual System
Name: AHU Assembly
Type: Variable Air Volume
Occupancy: Assembly
Control Zone: Room_1000 corr 45-46
Number of Conditioned Zones Served: 7
Total Conditioned Area Served (ft²): 81728.8
Average Air Flow per Conditioned Area (cfm/ft²): 1.08

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Autosized Capacity	2488.63
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	88303

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	5121.32
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Base Case

Individual System
Name: System_38091
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 88199.9
Average Air Flow per Conditioned Area (cfm/ft²): 0.78

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3666.49	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		68519

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	2268.78
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Mitigated Case

Individual System
Name: System_38091
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 88199.9
Average Air Flow per Conditioned Area (cfm/ft²): 0.73

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		64615

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Base Case

Individual System
Name: System_38092
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 8999.6
Average Air Flow per Conditioned Area (cfm/ft²): 1.48

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	665.63	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		13330

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	406.8
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Mitigated Case

Individual System
Name: System_38092
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 8999.6
Average Air Flow per Conditioned Area (cfm/ft²): 1.43

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		12843

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Base Case

Individual System
Name: System_38093
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40578.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.69

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3386.97	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		68484

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	2054.47
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Mitigated Case

Individual System
Name: System_38093
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40578.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.65

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		66926

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Base Case

Individual System
Name: System_38094
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40475.9
Average Air Flow per Conditioned Area (cfm/ft²): 1.57

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3153.27	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		63419

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1921.76
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Mitigated Case

Individual System
Name: System_38094
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40475.9
Average Air Flow per Conditioned Area (cfm/ft²): 1.53

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		61931

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Base Case

Individual System
Name: System_38095
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 9010.5
Average Air Flow per Conditioned Area (cfm/ft²): 1.82

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	808.31	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		16429

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	488.84
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Mitigated Case

Individual System
Name: System_38095
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 9010.5
Average Air Flow per Conditioned Area (cfm/ft²): 1.78

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		16005

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Base Case

Individual System
Name: AHU MAU Ph1
Type: Constant Volume Reheat Fan System
Occupancy: Restaurant
Control Zone: Kitchen MAU
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 1.0
Average Air Flow per Conditioned Area (cfm/ft²): 50000.00

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Furnace	

Furnace

Thermal Efficiency	0.8
Auxillary Power (kW)	0
Pilot Light (Btu/hr)	500

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.000683	
Motor Efficiency	0.95	
Delta-T	0.8 °F	
Air Flow (cfm)		50000

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	2668.37
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative B: Mitigated Case

Individual System
Name: Kitchen MAU
Type: Constant Volume Reheat Fan System
Occupancy: Restaurant
Control Zone: Kitchen MAU
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 1.0
Average Air Flow per Conditioned Area (cfm/ft²): 50000.00

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Furnace	

Furnace

Thermal Efficiency	0.8
Auxillary Power (kW)	0
Pilot Light (Btu/hr)	500

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.000683	
Motor Efficiency	0.95	
Delta-T	0.8 °F	
Air Flow (cfm)		50000

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	2668.37
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Project Information

Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Weather File: MA_Boston_Logan_Intl_Arp
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Calculation Engine: DOE-2.1E-119

Electrical Use Summary

Alternative	Lights	Equipment	Cooling	Tower/Heat Reject.	Pumps/Aux.	Fans	Ext. Lights	Ext. Equip.	Total
Electrical End-use Totals (kWh)									
Alt B Base Case	4,695,266	10,146,200	3,858,756	616,463	207,488	5,242,474	528,885	0	25,295,530
Alt B Design Case	3,300,247	10,146,200	2,341,579	269,372	168,974	2,861,657	459,900	156,658	19,704,590
Incremental Electrical Savings (kWh)			(compared with previous alternative, negative savings represent increases)						
Alt B Design Case	1,395,019	0	1,517,177	347,091	38,514	2,380,817	68,985	-156,658	5,590,946

Fuel Use Summary

Alternative	Source	Heating	Hot Water	Total
Fuel End-Use Totals				
Alt B Base Case - Natural Gas (Therm)	754,109	275,401	204,806	1,234,316
Alt B Design Case - Natural Gas (Therm)	522,475	225,307	191,700	939,482
Incremental Fuel Savings	(compared with previous alternative, negative savings represent increases)			
Alt B Design Case - Natural Gas (Therm)	231,634	50,094	13,106	294,834

Energy Cost Summary ($/y)

Alternative	Total Electric	Total Fuel	Total Utility	Incremental First Cost	PV Life Cycle Cost*
Total Energy Cost ($/y)					
Alt B Base Case	$3,683,044	$1,320,706	$5,003,750	$0	$42,599,740
Alt B Design Case	$2,868,982	$1,005,246	$3,874,228	$0	$32,983,490
Incremental Energy Cost Savings ($/y)		(compared with previous alternative, negative savings represent increases)			
Alt B Design Case	$814,062	$315,460	$1,129,522	$0	$9,616,258

* 20 year life cycle w/ 10% discount rate.

Monthly Electrical Usage (kWh)

Alternative	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Alt B Base Case	2,015,980	1,812,461	2,002,192	1,889,161	2,118,721	2,241,217	2,567,195	2,525,985	2,225,342	2,021,422	1,894,429	1,981,533
Alt B Design Case	1,578,702	1,407,669	1,553,444	1,466,661	1,653,620	1,754,649	2,004,569	1,968,170	1,733,427	1,576,243	1,468,845	1,538,552

Monthly Electrical Power Demand (kW)

Alternative	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Alt B Base Case	3,489	3,355	3,445	3,941	3,993	4,371	4,441	4,351	4,035	3,691	3,362	3,336
Alt B Design Case	2,871	2,630	2,688	3,164	3,229	3,531	3,557	3,504	3,240	2,980	2,629	2,624

Monthly Fuel Usage

Alternative	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Alt B Base Case - Natural Gas (Therm)	139,307	118,385	117,529	101,204	94,481	87,290	86,620	86,226	84,338	93,360	103,990	121,576
Alt B Design Case - Natural Gas (Therm)	112,042	92,990	90,299	76,277	70,940	65,233	64,365	63,924	62,507	69,163	77,869	93,873

Alternative C: Base Case

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Gross Area: 2,240,880 ft²
Conditioned Area: 1,074,639 ft²
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt C Base Case
Case Description: Ph1a b 2 3
Number of Blocks: 15

Block 1, Level 2: PH 1a

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	32	Number of Floors	1
Number of Facades	8		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	-311.4	-1845.0
Y	0	Pt. 2	-398.7	-1845.0
Z	14	Pt. 3	-499.2	-1745.2
		Pt. 4	-506.8	-1752.7
		Pt. 5	-561.5	-1752.7
		Pt. 6	-561.5	-1619.3
		Pt. 7	-561.5	-1532.6
		Pt. 8	-462.8	-1532.6
		Pt. 9	-462.8	-1573.1
		Pt. 10	-454.3	-1573.1
		Pt. 11	-442.4	-1573.1
		Pt. 12	-442.4	-1547.0
		Pt. 13	-442.4	-1532.0
		Pt. 14	-227.8	-1532.0
		Pt. 15	-171.3	-1532.0
		Pt. 16	-66.1	-1532.0
		Pt. 17	-18.1	-1532.0
		Pt. 18	-18.1	-1547.0
		Pt. 19	-18.1	-1575.3
		Pt. 20	2.2	-1575.3
		Pt. 21	2.2	-1532.5
		Pt. 22	163.8	-1532.5
		Pt. 23	163.8	-1587.4
		Pt. 24	163.8	-1650.4
		Pt. 25	149.4	-1661.8
		Pt. 26	125.9	-1640.6
		Pt. 27	105.9	-1661.8
		Pt. 28	95.1	-1653.3
		Pt. 29	79.7	-1674.8
		Pt. 30	119.5	-1699.5
		Pt. 31	112.2	-1714.4
		Pt. 32	107.4	-1723.3
		Pt. 33	119.3	-1727.8
		Pt. 34	110.3	-1775.0
		Pt. 35	99.7	-1775.0
		Pt. 36	102.1	-1801.6
		Pt. 37	94.4	-1802.3
		Pt. 38	96.4	-1810.1
		Pt. 39	68.2	-1816.0
		Pt. 40	28.5	-1824.7
		Pt. 41	11.3	-1828.5
		Pt. 42	11.3	-1836.6
		Pt. 43	-79.6	-1836.6
		Pt. 44	-98.7	-1855.8
		Pt. 45	-71.9	-1977.1
		Pt. 46	-67.4	-1997.8

Alternative C: Mitigated Case

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Gross Area: 2,240,880 ft²
Conditioned Area: 1,074,639 ft²
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt C Design Case
Case Description: Ph1a b 2 3
Number of Blocks: 15

Block 1, Level 2: PH 1a

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	32	Number of Floors	1
Number of Facades	8		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	-311.4	-1845.0
Y	0	Pt. 2	-398.7	-1845.0
Z	14	Pt. 3	-499.2	-1745.2
		Pt. 4	-506.8	-1752.7
		Pt. 5	-561.5	-1752.7
		Pt. 6	-561.5	-1619.3
		Pt. 7	-561.5	-1532.6
		Pt. 8	-462.8	-1532.6
		Pt. 9	-462.8	-1573.1
		Pt. 10	-454.3	-1573.1
		Pt. 11	-442.4	-1573.1
		Pt. 12	-442.4	-1547.0
		Pt. 13	-442.4	-1532.0
		Pt. 14	-227.8	-1532.0
		Pt. 15	-171.3	-1532.0
		Pt. 16	-66.1	-1532.0
		Pt. 17	-18.1	-1532.0
		Pt. 18	-18.1	-1547.0
		Pt. 19	-18.1	-1575.3
		Pt. 20	2.2	-1575.3
		Pt. 21	2.2	-1532.5
		Pt. 22	163.8	-1532.5
		Pt. 23	163.8	-1587.4
		Pt. 24	163.8	-1650.4
		Pt. 25	149.4	-1661.8
		Pt. 26	125.9	-1640.6
		Pt. 27	105.9	-1661.8
		Pt. 28	95.1	-1653.3
		Pt. 29	79.7	-1674.8
		Pt. 30	119.5	-1699.5
		Pt. 31	112.2	-1714.4
		Pt. 32	107.4	-1723.3
		Pt. 33	119.3	-1727.8
		Pt. 34	110.3	-1775.0
		Pt. 35	99.7	-1775.0
		Pt. 36	102.1	-1801.6
		Pt. 37	94.4	-1802.3
		Pt. 38	96.4	-1810.1
		Pt. 39	68.2	-1816.0
		Pt. 40	28.5	-1824.7
		Pt. 41	11.3	-1828.5
		Pt. 42	11.3	-1836.6
		Pt. 43	-79.6	-1836.6
		Pt. 44	-98.7	-1855.8
		Pt. 45	-71.9	-1977.1
		Pt. 46	-67.4	-1997.8

Alternative C: Base Case

Pt. 47	-127.3	-1997.8
Pt. 48	-127.3	-1955.0
Pt. 49	-135.3	-1911.5
Pt. 50	-153.7	-1877.7
Pt. 51	-197.9	-1850.5
Pt. 52	-221.1	-1845.0

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_221854 g	5	7.5	5
Surface_221856 g	5	7.5	5
Surface_221857 g	5	7.5	5
Surface_221896 g	5	7.5	5
Surface_221962 g	5	7.5	5
Surface_221964 g	5	7.5	5
Surface_222026 g	5	7.5	5
Surface_222072 g	5	7.5	5
Surface_222074 g	5	7.5	5
Surface_222076 g	5	7.5	5
Surface_222077 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22185 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22185 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22185 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22189 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22196 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22196 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22202 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_221709	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221817	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221818	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221819	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221822	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221823	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221824	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221841	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221842	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221843	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative C: Mitigated Case

Pt. 47	-127.3	-1997.8
Pt. 48	-127.3	-1955.0
Pt. 49	-135.3	-1911.5
Pt. 50	-153.7	-1877.7
Pt. 51	-197.9	-1850.5
Pt. 52	-221.1	-1845.0

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_221854 g	5	7.5	5
Surface_221856 g	5	7.5	5
Surface_221857 g	5	7.5	5
Surface_221896 g	5	7.5	5
Surface_221962 g	5	7.5	5
Surface_221964 g	5	7.5	5
Surface_222026 g	5	7.5	5
Surface_222072 g	5	7.5	5
Surface_222074 g	5	7.5	5
Surface_222076 g	5	7.5	5
Surface_222077 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22185 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22185 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22185 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22189 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22196 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22196 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22202 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22207 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_221709	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221817	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221818	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221819	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221822	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221823	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221824	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221841	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221842	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221843	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative C: Base Case

Surface_221844	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221845	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221853	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221854	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221856	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221857	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221892	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221896	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221898	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221899	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221900	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221901	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221915	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222056	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221952	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221953	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221954	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221962	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221963	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221964	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_221965	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221966	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221967	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221969	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_221970	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222011	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222012	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222025	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222026	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_222050	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222051	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222052	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222053	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222054	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222055	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222068	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222070	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222072	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_222074	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_222075	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222076	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_222077	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							

Alternative C: Mitigated Case

Surface_221844	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221845	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221853	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221854	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221856	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221857	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221892	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221896	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221898	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221899	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221900	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221901	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221915	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222056	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221952	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221953	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221954	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221962	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221963	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221964	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_221965	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221966	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221967	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221969	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_221970	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222011	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222012	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222025	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222026	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_222050	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222051	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222052	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222053	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222054	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222055	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222068	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222070	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222072	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_222074	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_222075	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222076	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_222077	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							

Alternative C: Base Case

Block 2, Level 2: PH 1b

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	19	Number of Floors	1
Number of Facades	10		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	331.4	-2055.3
Y	0	Pt. 2	342.9	-2055.3
Z	14	Pt. 3	356.5	-2055.3
		Pt. 4	379.7	-2071.3
		Pt. 5	399.7	-2094.2
		Pt. 6	422.9	-2139.5
		Pt. 7	342.9	-2139.5
		Pt. 8	342.9	-2180.0
		Pt. 9	342.9	-2196.3
		Pt. 10	129.7	-2196.3
		Pt. 11	129.7	-2256.6
		Pt. 12	67.1	-2256.6
		Pt. 13	9.7	-2256.6
		Pt. 14	-6.6	-2256.6
		Pt. 15	-127.3	-2133.6
		Pt. 16	-127.3	-2052.9
		Pt. 17	-127.3	-1997.8
		Pt. 18	-112.3	-1997.8
		Pt. 19	-67.4	-1997.8
		Pt. 20	-71.9	-1977.1
		Pt. 21	-98.7	-1855.8
		Pt. 22	-79.6	-1836.6
		Pt. 23	11.3	-1836.6
		Pt. 24	11.3	-1828.5
		Pt. 25	28.5	-1824.7
		Pt. 26	45.2	-1872.1
		Pt. 27	54.8	-1865.0
		Pt. 28	73.5	-1898.8
		Pt. 29	81.4	-1909.6
		Pt. 30	109.9	-1939.8
		Pt. 31	143.3	-1963.5
		Pt. 32	168.6	-1975.7
		Pt. 33	213.8	-1987.6
		Pt. 34	238.7	-1990.8
		Pt. 35	268.2	-1990.9
		Pt. 36	292.6	-1987.8
		Pt. 37	296.3	-2011.4
		Pt. 38	331.4	-2029.7

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_222271	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_222271	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative C: Mitigated Case

Block 2, Level 2: PH 1b

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	19	Number of Floors	1
Number of Facades	10		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	331.4	-2055.3
Y	0	Pt. 2	342.9	-2055.3
Z	14	Pt. 3	356.5	-2055.3
		Pt. 4	379.7	-2071.3
		Pt. 5	399.7	-2094.2
		Pt. 6	422.9	-2139.5
		Pt. 7	342.9	-2139.5
		Pt. 8	342.9	-2180.0
		Pt. 9	342.9	-2196.3
		Pt. 10	129.7	-2196.3
		Pt. 11	129.7	-2256.6
		Pt. 12	67.1	-2256.6
		Pt. 13	9.7	-2256.6
		Pt. 14	-6.6	-2256.6
		Pt. 15	-127.3	-2133.6
		Pt. 16	-127.3	-2052.9
		Pt. 17	-127.3	-1997.8
		Pt. 18	-112.3	-1997.8
		Pt. 19	-67.4	-1997.8
		Pt. 20	-71.9	-1977.1
		Pt. 21	-98.7	-1855.8
		Pt. 22	-79.6	-1836.6
		Pt. 23	11.3	-1836.6
		Pt. 24	11.3	-1828.5
		Pt. 25	28.5	-1824.7
		Pt. 26	45.2	-1872.1
		Pt. 27	54.8	-1865.0
		Pt. 28	73.5	-1898.8
		Pt. 29	81.4	-1909.6
		Pt. 30	109.9	-1939.8
		Pt. 31	143.3	-1963.5
		Pt. 32	168.6	-1975.7
		Pt. 33	213.8	-1987.6
		Pt. 34	238.7	-1990.8
		Pt. 35	268.2	-1990.9
		Pt. 36	292.6	-1987.8
		Pt. 37	296.3	-2011.4
		Pt. 38	331.4	-2029.7

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_222271	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_222271	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative C: Base Case

VisualDOE 4.1 - Architectural Details **April 3, 2014**

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_222197	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222212	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222213	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222214	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222215	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222217	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222218	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222219	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222220	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222221	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222222	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222223	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222244	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222246	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222247	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222248	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222249	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222250	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222251	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222252	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222253	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222254	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222255	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222256	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222257	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222258	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222259	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222260	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222261	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222262	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222263	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222264	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222265	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222266	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222267	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222269	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_222271	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_222272	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative C: Mitigated Case

VisualDOE 4.1 - Architectural Details **April 3, 2014**

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_222197	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222212	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222213	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222214	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222215	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222217	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222218	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222219	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222220	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222221	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222222	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222223	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222244	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222246	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222247	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222248	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222249	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222250	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222251	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222252	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222253	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222254	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222255	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222256	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222257	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222258	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222259	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222260	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222261	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222262	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222263	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222264	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222265	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222266	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222267	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222269	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_222271	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_222272	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative C: Base Case

Block 3, Level 2: PH 2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	6	Number of Floors	1
Number of Facades	6		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	102.1	-1801.6
Y	0	Pt. 2	119.2	-1799.7
Z	14	Pt. 3	129.4	-1831.8
		Pt. 4	141.4	-1853.0
		Pt. 5	164.8	-1878.9
		Pt. 6	184.0	-1892.8
		Pt. 7	202.9	-1904.1
		Pt. 8	227.9	-1909.3
		Pt. 9	239.2	-1910.7
		Pt. 10	237.8	-1933.0
		Pt. 11	251.5	-1933.9
		Pt. 12	251.6	-1929.0
		Pt. 13	278.7	-1927.0
		Pt. 14	279.3	-1930.4
		Pt. 15	282.9	-1929.8
		Pt. 16	286.2	-1960.4
		Pt. 17	292.6	-1987.8
		Pt. 18	268.2	-1990.9
		Pt. 19	238.7	-1990.8
		Pt. 20	213.8	-1987.6
		Pt. 21	168.6	-1975.7
		Pt. 22	143.3	-1963.5
		Pt. 23	109.9	-1939.8
		Pt. 24	81.4	-1909.6
		Pt. 25	73.5	-1898.8
		Pt. 26	54.8	-1865.0
		Pt. 27	45.2	-1872.1
		Pt. 28	28.5	-1824.7
		Pt. 29	68.2	-1816.0
		Pt. 30	96.4	-1810.1
		Pt. 31	94.4	-1802.3

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_224303 g	5	7.5	5
Surface_224304 g	5	7.5	5
Surface_224305 g	5	7.5	5
Surface_224306 g	5	7.5	5
Surface_224341 g	5	7.5	5
Surface_224342 g	5	7.5	5
Surface_224345 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22430 3 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22430 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative C: Mitigated Case

Block 3, Level 2: PH 2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	6	Number of Floors	1
Number of Facades	6		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	102.1	-1801.6
Y	0	Pt. 2	119.2	-1799.7
Z	14	Pt. 3	129.4	-1831.8
		Pt. 4	141.4	-1853.0
		Pt. 5	164.8	-1878.9
		Pt. 6	184.0	-1892.8
		Pt. 7	202.9	-1904.1
		Pt. 8	227.9	-1909.3
		Pt. 9	239.2	-1910.7
		Pt. 10	237.8	-1933.0
		Pt. 11	251.5	-1933.9
		Pt. 12	251.6	-1929.0
		Pt. 13	278.7	-1927.0
		Pt. 14	279.3	-1930.4
		Pt. 15	282.9	-1929.8
		Pt. 16	286.2	-1960.4
		Pt. 17	292.6	-1987.8
		Pt. 18	268.2	-1990.9
		Pt. 19	238.7	-1990.8
		Pt. 20	213.8	-1987.6
		Pt. 21	168.6	-1975.7
		Pt. 22	143.3	-1963.5
		Pt. 23	109.9	-1939.8
		Pt. 24	81.4	-1909.6
		Pt. 25	73.5	-1898.8
		Pt. 26	54.8	-1865.0
		Pt. 27	45.2	-1872.1
		Pt. 28	28.5	-1824.7
		Pt. 29	68.2	-1816.0
		Pt. 30	96.4	-1810.1
		Pt. 31	94.4	-1802.3

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_224303 g	5	7.5	5
Surface_224304 g	5	7.5	5
Surface_224305 g	5	7.5	5
Surface_224306 g	5	7.5	5
Surface_224341 g	5	7.5	5
Surface_224342 g	5	7.5	5
Surface_224345 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22430 3 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22430 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative C: Base Case

Surface_22430 5 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22430 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22434 1 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22434 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22434 5 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_224302	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224303 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224304 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224305 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224306 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224313	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224314	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224332	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224333	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224340	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224341 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224342 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224345 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224346	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224347	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224348	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224349	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224350	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224354	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224355	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224356	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224357	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224358	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224359	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224360	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224361	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224362	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224363	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224364	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224365	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224366	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative C: Mitigated Case

Surface_22430 5 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22430 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22434 1 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22434 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22434 5 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_224302	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224303 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224304 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224305 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224306 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224313	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224314	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224332	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224333	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224340	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224341 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224342 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224345 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224346	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224347	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224348	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224349	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224350	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224354	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224355	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224356	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224357	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224358	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224359	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224360	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224361	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224362	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224363	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224364	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224365	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224366	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative C: Base Case

Block 4, Level 2: PH 3

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	10	Number of Floors	1
Number of Facades	4		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	282.9	-1929.8
Y	0	Pt. 2	279.3	-1930.4
Z	52	Pt. 3	278.7	-1927.0
		Pt. 4	282.0	-1905.3
		Pt. 5	309.7	-1904.6
		Pt. 6	361.2	-1911.1
		Pt. 7	420.0	-1931.9
		Pt. 8	415.5	-1941.0
		Pt. 9	443.9	-1957.2
		Pt. 10	519.1	-2082.1
		Pt. 11	526.7	-2113.7
		Pt. 12	566.7	-2113.7
		Pt. 13	566.7	-2262.5
		Pt. 14	342.9	-2262.5
		Pt. 15	342.9	-2196.3
		Pt. 16	342.9	-2139.5
		Pt. 17	422.9	-2139.5
		Pt. 18	399.7	-2094.2
		Pt. 19	379.7	-2071.3
		Pt. 20	356.5	-2055.3
		Pt. 21	342.9	-2055.3
		Pt. 22	331.4	-2055.3
		Pt. 23	331.4	-2029.7
		Pt. 24	296.3	-2011.4
		Pt. 25	292.6	-1987.8
		Pt. 26	286.2	-1960.4

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_224370 g	5	7.5	5
Surface_224371 g	5	7.5	5
Surface_224372 g	5	7.5	5
Surface_224373 g	5	7.5	5
Surface_224374 g	5	7.5	5
Surface_224433	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_224370 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224371 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224372 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224373 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224374 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative C: Mitigated Case

Block 4, Level 2: PH 3

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	10	Number of Floors	1
Number of Facades	4		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	282.9	-1929.8
Y	0	Pt. 2	279.3	-1930.4
Z	52	Pt. 3	278.7	-1927.0
		Pt. 4	282.0	-1905.3
		Pt. 5	309.7	-1904.6
		Pt. 6	361.2	-1911.1
		Pt. 7	420.0	-1931.9
		Pt. 8	415.5	-1941.0
		Pt. 9	443.9	-1957.2
		Pt. 10	519.1	-2082.1
		Pt. 11	526.7	-2113.7
		Pt. 12	566.7	-2113.7
		Pt. 13	566.7	-2262.5
		Pt. 14	342.9	-2262.5
		Pt. 15	342.9	-2196.3
		Pt. 16	342.9	-2139.5
		Pt. 17	422.9	-2139.5
		Pt. 18	399.7	-2094.2
		Pt. 19	379.7	-2071.3
		Pt. 20	356.5	-2055.3
		Pt. 21	342.9	-2055.3
		Pt. 22	331.4	-2055.3
		Pt. 23	331.4	-2029.7
		Pt. 24	296.3	-2011.4
		Pt. 25	292.6	-1987.8
		Pt. 26	286.2	-1960.4

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_224370 g	5	7.5	5
Surface_224371 g	5	7.5	5
Surface_224372 g	5	7.5	5
Surface_224373 g	5	7.5	5
Surface_224374 g	5	7.5	5
Surface_224433	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_224370 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224371 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224372 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224373 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_224374 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative C: Base Case

Surface_224433	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_224367	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224368	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224369	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224370	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224371	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224372	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224373	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224374	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224398	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224399	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224400	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224401	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224402	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224403	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224405	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224406	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224407	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224408	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224424	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224425	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224430	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224431	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224432	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224433	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_224438	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_224442	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative C: Mitigated Case

Surface_224433	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_224367	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224368	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224369	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224370	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224371	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224372	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224373	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224374	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224398	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224399	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224400	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224401	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224402	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224403	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224405	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224406	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224407	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224408	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224424	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224425	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224430	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224431	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224432	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224433	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_224438	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_224442	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative C: Base Case

Block 5, Level 4: PH 3 N tower

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	10	Number of Floors	12
Number of Facades	4		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	-418	Pt. 1	223.4	-2019.1
Y	-1845	Pt. 2	32.3	-1873.9
Z	85	Pt. 3	71.6	-1822.1
		Pt. 4	262.7	-1967.3

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_1400	6	4.5	5.5
Surface_1402	6	4.5	5.5
Surface_1404	6	4.5	5.5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_1400	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_1402	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_1404	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_1400	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_1402	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_1404	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_1405	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative C: Mitigated Case

Block 5, Level 4: PH 3 N tower

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	10	Number of Floors	12
Number of Facades	4		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	-418	Pt. 1	223.4	-2019.1
Y	-1845	Pt. 2	32.3	-1873.9
Z	85	Pt. 3	71.6	-1822.1
		Pt. 4	262.7	-1967.3

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_1400	6	4.5	5.5
Surface_1402	6	4.5	5.5
Surface_1404	6	4.5	5.5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_1400	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_1402	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_1404	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_1400	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_1402	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_1404	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_1405	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative C: Base Case

Block 6, Level 4: PH 3 S tower

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	10	Number of Floors	12
Number of Facades	4		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	-418	Pt. 1	414.5	-2164.3
Y	-1845	Pt. 2	223.4	-2019.1
Z	85	Pt. 3	262.7	-1967.3
		Pt. 4	453.8	-2112.5

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_1411	6	4.5	5.5
Surface_1415	6	4.5	5.5
Surface_1416	6	4.5	5.5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_1411	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_1415	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_1416	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_1411	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_1415	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_1416	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_1417	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative C: Mitigated Case

Block 6, Level 4: PH 3 S tower

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	10	Number of Floors	12
Number of Facades	4		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	-418	Pt. 1	414.5	-2164.3
Y	-1845	Pt. 2	223.4	-2019.1
Z	85	Pt. 3	262.7	-1967.3
		Pt. 4	453.8	-2112.5

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_1411	6	4.5	5.5
Surface_1415	6	4.5	5.5
Surface_1416	6	4.5	5.5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_1411	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_1415	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_1416	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_1411	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_1415	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_1416	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_1417	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative C: Base Case

Block 7, Level 1: Garage 1

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	1 ft
Number of Zones	1	Number of Floors	4
Number of Facades	12		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	1139.3	-1753.0
Y	0	Pt. 2	1139.3	-2106.0
Z	0	Pt. 3	786.3	-2106.0
		Pt. 4	786.3	-1753.0

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228915	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228916	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228917	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228918	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative C: Mitigated Case

Block 7, Level 1: Garage 1

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	1 ft
Number of Zones	1	Number of Floors	4
Number of Facades	12		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	1139.3	-1753.0
Y	0	Pt. 2	1139.3	-2106.0
Z	0	Pt. 3	786.3	-2106.0
		Pt. 4	786.3	-1753.0

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	garage rf	0.250	10.6
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228915	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228916	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228917	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228918	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative C: Base Case

Block 8, Level 1: Garage 2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	1 ft
Number of Zones	1	Number of Floors	3
Number of Facades	7		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	786.3	-1253.8
Y	0	Pt. 2	1181.3	-1253.8
Z	0	Pt. 3	1181.3	-1648.8
		Pt. 4	786.3	-1648.8

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228919	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228920	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228921	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228922	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative C: Mitigated Case

Block 8, Level 1: Garage 2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	1 ft
Number of Zones	1	Number of Floors	3
Number of Facades	7		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	786.3	-1253.8
Y	0	Pt. 2	1181.3	-1253.8
Z	0	Pt. 3	1181.3	-1648.8
		Pt. 4	786.3	-1648.8

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	garage rf	0.250	10.6
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228919	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228920	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228921	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228922	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative C: Base Case

Block 9, Level 1: PH 1a Lower Level

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	14 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	14	Number of Floors	1
Number of Facades	55		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	192.9	-2059.8
Y	0	Pt. 2	301.9	-2059.8
Z	0	Pt. 3	301.9	-2068.0
		Pt. 4	321.2	-2068.0
		Pt. 5	321.3	-2244.8
		Pt. 6	302.0	-2244.8
		Pt. 7	302.0	-2256.1
		Pt. 8	220.9	-2256.1
		Pt. 9	220.9	-2181.3
		Pt. 10	211.9	-2181.3
		Pt. 11	211.9	-2166.3
		Pt. 12	192.9	-2166.3
		Pt. 13	192.9	-2135.0
		Pt. 14	132.2	-2135.0
		Pt. 15	132.2	-2257.5
		Pt. 16	-7.0	-2257.5
		Pt. 17	-127.3	-2126.8
		Pt. 18	-127.3	-1955.0
		Pt. 19	-142.8	-1897.5
		Pt. 20	-170.3	-1874.3
		Pt. 21	-200.3	-1855.4
		Pt. 22	-230.3	-1847.5
		Pt. 23	-270.0	-1847.5
		Pt. 24	-417.0	-1847.5
		Pt. 25	-433.8	-1830.7
		Pt. 26	-562.8	-1701.8
		Pt. 27	-562.8	-1653.1
		Pt. 28	-562.8	-1589.5
		Pt. 29	-562.8	-1532.0
		Pt. 30	-527.9	-1532.0
		Pt. 31	-440.3	-1532.0
		Pt. 32	-364.8	-1532.0
		Pt. 33	-171.5	-1532.0
		Pt. 34	-17.8	-1532.0
		Pt. 35	-17.8	-1566.1
		Pt. 36	3.2	-1566.1
		Pt. 37	3.2	-1532.0
		Pt. 38	162.4	-1532.0
		Pt. 39	162.4	-1659.4
		Pt. 40	129.7	-1695.1
		Pt. 41	109.8	-1741.8
		Pt. 42	106.7	-1786.8
		Pt. 43	106.7	-1805.7
		Pt. 44	12.9	-1805.7
		Pt. 45	12.9	-1854.2
		Pt. 46	37.8	-1854.2
		Pt. 47	42.1	-1865.0
		Pt. 48	57.7	-1895.3
		Pt. 49	79.4	-1925.0
		Pt. 50	99.7	-1945.9
		Pt. 51	110.7	-1955.2
		Pt. 52	129.7	-1968.7
		Pt. 53	159.7	-1985.0
		Pt. 54	192.9	-1996.7
		Pt. 55	192.9	-2013.0

Block Constructions

Alternative C: Mitigated Case

Block 9, Level 1: PH 1a Lower Level

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	14 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	14	Number of Floors	1
Number of Facades	55		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	192.9	-2059.8
Y	0	Pt. 2	301.9	-2059.8
Z	0	Pt. 3	301.9	-2068.0
		Pt. 4	321.2	-2068.0
		Pt. 5	321.3	-2244.8
		Pt. 6	302.0	-2244.8
		Pt. 7	302.0	-2256.1
		Pt. 8	220.9	-2256.1
		Pt. 9	220.9	-2181.3
		Pt. 10	211.9	-2181.3
		Pt. 11	211.9	-2166.3
		Pt. 12	192.9	-2166.3
		Pt. 13	192.9	-2135.0
		Pt. 14	132.2	-2135.0
		Pt. 15	132.2	-2257.5
		Pt. 16	-7.0	-2257.5
		Pt. 17	-127.3	-2126.8
		Pt. 18	-127.3	-1955.0
		Pt. 19	-142.8	-1897.5
		Pt. 20	-170.3	-1874.3
		Pt. 21	-200.3	-1855.4
		Pt. 22	-230.3	-1847.5
		Pt. 23	-270.0	-1847.5
		Pt. 24	-417.0	-1847.5
		Pt. 25	-433.8	-1830.7
		Pt. 26	-562.8	-1701.8
		Pt. 27	-562.8	-1653.1
		Pt. 28	-562.8	-1589.5
		Pt. 29	-562.8	-1532.0
		Pt. 30	-527.9	-1532.0
		Pt. 31	-440.3	-1532.0
		Pt. 32	-364.8	-1532.0
		Pt. 33	-171.5	-1532.0
		Pt. 34	-17.8	-1532.0
		Pt. 35	-17.8	-1566.1
		Pt. 36	3.2	-1566.1
		Pt. 37	3.2	-1532.0
		Pt. 38	162.4	-1532.0
		Pt. 39	162.4	-1659.4
		Pt. 40	129.7	-1695.1
		Pt. 41	109.8	-1741.8
		Pt. 42	106.7	-1786.8
		Pt. 43	106.7	-1805.7
		Pt. 44	12.9	-1805.7
		Pt. 45	12.9	-1854.2
		Pt. 46	37.8	-1854.2
		Pt. 47	42.1	-1865.0
		Pt. 48	57.7	-1895.3
		Pt. 49	79.4	-1925.0
		Pt. 50	99.7	-1945.9
		Pt. 51	110.7	-1955.2
		Pt. 52	129.7	-1968.7
		Pt. 53	159.7	-1985.0
		Pt. 54	192.9	-1996.7
		Pt. 55	192.9	-2013.0

Block Constructions

Alternative C: Base Case

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_227366 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22736 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_227230	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227231	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227232	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227233	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227234	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227235	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227236	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227237	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227238	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227239	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227240	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227241	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227267	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227268	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227269	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227276	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227278	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227279	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227280	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227281	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227282	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227283	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227307	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227286	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227287	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227288	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227289	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227290	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227291	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227292	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227293	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227294	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227295	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227300	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227301	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227302	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227303	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227304	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227305	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227306	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227309	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227344	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227352	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227353	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227354	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227356	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227361	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227364	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative C: Mitigated Case

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_227366 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22736 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_227230	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227231	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227232	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227233	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227234	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227235	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227236	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227237	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227238	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227239	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227240	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227241	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227267	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227268	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227269	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227276	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227278	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227279	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227280	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227281	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227282	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227283	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227307	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227286	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227287	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227288	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227289	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227290	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227291	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227292	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227293	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227294	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227295	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227300	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227301	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227302	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227303	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227304	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227305	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227306	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227309	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227344	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227352	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227353	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227354	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227356	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227361	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227364	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative C: Base Case

Surface_227366	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
g							
Surface_227367	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227369	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227370	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227371	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227372	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_227373	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative C: Mitigated Case

Surface_227366	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
g							
Surface_227367	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227369	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227370	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227371	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227372	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_227373	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative C: Base Case

Block 10, Level 3: PH 1a lvl2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	12	Number of Floors	1
Number of Facades	28		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	9.7	-1686.1
Y	0	Pt. 2	9.7	-1715.0
Z	34	Pt. 3	-50.3	-1715.0
		Pt. 4	-50.3	-1572.7
		Pt. 5	9.7	-1572.7
		Pt. 6	9.7	-1565.0
		Pt. 7	-2.3	-1565.0
		Pt. 8	-2.3	-1533.0
		Pt. 9	163.8	-1533.0
		Pt. 10	163.8	-1654.4
		Pt. 11	205.1	-1632.7
		Pt. 12	258.9	-1624.8
		Pt. 13	421.1	-1367.6
		Pt. 14	440.4	-1378.1
		Pt. 15	281.3	-1634.1
		Pt. 16	276.9	-1651.8
		Pt. 17	206.3	-1658.9
		Pt. 18	152.8	-1700.1
		Pt. 19	127.8	-1765.8
		Pt. 20	135.0	-1819.2
		Pt. 21	77.5	-1840.2
		Pt. 22	71.0	-1822.4
		Pt. 23	97.0	-1815.8
		Pt. 24	92.1	-1775.0
		Pt. 25	99.7	-1726.7
		Pt. 26	115.7	-1714.4
		Pt. 27	88.8	-1703.3
		Pt. 28	88.8	-1685.9

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_228961 g	5	7.5	5
Surface_228981 g	10	7.5	5
Surface_228992	10	7.5	5
Surface_229002 g	5	7.5	5
Surface_229004 g	5	7.5	5
Surface_229005 g	5	7.5	5
Surface_229006 g	5	7.5	5
Surface_229007 g	5	7.5	5
Surface_229009 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22896 1 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22898 1 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative C: Mitigated Case

Block 10, Level 3: PH 1a lvl2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	12	Number of Floors	1
Number of Facades	28		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	9.7	-1686.1
Y	0	Pt. 2	9.7	-1715.0
Z	34	Pt. 3	-50.3	-1715.0
		Pt. 4	-50.3	-1572.7
		Pt. 5	9.7	-1572.7
		Pt. 6	9.7	-1565.0
		Pt. 7	-2.3	-1565.0
		Pt. 8	-2.3	-1533.0
		Pt. 9	163.8	-1533.0
		Pt. 10	163.8	-1654.4
		Pt. 11	205.1	-1632.7
		Pt. 12	258.9	-1624.8
		Pt. 13	421.1	-1367.6
		Pt. 14	440.4	-1378.1
		Pt. 15	281.3	-1634.1
		Pt. 16	276.9	-1651.8
		Pt. 17	206.3	-1658.9
		Pt. 18	152.8	-1700.1
		Pt. 19	127.8	-1765.8
		Pt. 20	135.0	-1819.2
		Pt. 21	77.5	-1840.2
		Pt. 22	71.0	-1822.4
		Pt. 23	97.0	-1815.8
		Pt. 24	92.1	-1775.0
		Pt. 25	99.7	-1726.7
		Pt. 26	115.7	-1714.4
		Pt. 27	88.8	-1703.3
		Pt. 28	88.8	-1685.9

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_228961 g	5	7.5	5
Surface_228981 g	10	7.5	5
Surface_228992	10	7.5	5
Surface_229002 g	5	7.5	5
Surface_229004 g	5	7.5	5
Surface_229005 g	5	7.5	5
Surface_229006 g	5	7.5	5
Surface_229007 g	5	7.5	5
Surface_229009 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_22896 1 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22898 1 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Alternative C: Base Case

Surface_22899 2	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 5 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 9 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228923	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228989	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228958	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228961 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_228979	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228980	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228981 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_228992	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_228995	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228996	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228997	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228998	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228999	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229000	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229001	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229002 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229003	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229004 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229005 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229006 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229007 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229008 g	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229009 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_229010	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229011	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229012	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229013	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_229017	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative C: Mitigated Case

Surface_22899 2	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 2 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 4 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 5 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 6 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 7 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_22900 9 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228923	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228989	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228958	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228961 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_228979	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228980	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228981 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_228992	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_228995	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228996	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228997	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228998	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228999	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229000	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229001	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229002 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229003	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229004 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229005 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229006 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229007 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229008 g	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229009 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_229010	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229011	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229012	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229013	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_229017	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative C: Base Case

Block 11, Level 3: PH 1a lvl2 restaurant

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	5	Number of Floors	1
Number of Facades	6		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	-230.3	-1636.0
Y	0	Pt. 2	-230.3	-1655.0
Z	34	Pt. 3	-350.3	-1655.0
		Pt. 4	-350.2	-1565.0
		Pt. 5	-230.4	-1565.0
		Pt. 6	-230.4	-1575.2

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_228880 g	5	7.5	5
Surface_228882 g	5	7.5	5
Surface_228884 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_228880 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_228882 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_228884 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228872	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228878	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228880 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_228882 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2
Surface_228883	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228884 g	mtl frm 90.1	.55	0.47	0.70	wl Z5 NR 90.1-07	0.064	0.2

Alternative C: Mitigated Case

Block 11, Level 3: PH 1a lvl2 restaurant

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	20 ft
Zoning	Custom	Plenum Height	5 ft
Number of Zones	5	Number of Floors	1
Number of Facades	6		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	-230.3	-1636.0
Y	0	Pt. 2	-230.3	-1655.0
Z	34	Pt. 3	-350.3	-1655.0
		Pt. 4	-350.2	-1565.0
		Pt. 5	-230.4	-1565.0
		Pt. 6	-230.4	-1575.2

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)
Surface_228880 g	5	7.5	5
Surface_228882 g	5	7.5	5
Surface_228884 g	5	7.5	5

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)
Surface_228880 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_228882 g	0	No	No	n.a.	n.a.	n.a.	n.a.
Surface_228884 g	0	No	No	n.a.	n.a.	n.a.	n.a.

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228872	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228878	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228880 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_228882 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2
Surface_228883	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228884 g	MC Glazing 1	.45	0.47	0.70	MC Wall	0.037	0.2

Alternative C: Base Case

Block 12, Level 3: PH 1a casino clerestory

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	15 ft
Zoning	Custom	Plenum Height	1 ft
Number of Zones	1	Number of Floors	1
Number of Facades	9		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	28.8	-1699.9
Y	0	Pt. 2	17.2	-1734.3
Z	34	Pt. 3	16.3	-1745.0
		Pt. 4	-499.2	-1745.2
		Pt. 5	-454.5	-1699.9
		Pt. 6	-50.3	-1699.9
		Pt. 7	-50.3	-1715.0
		Pt. 8	9.7	-1715.0
		Pt. 9	9.7	-1699.9

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228890	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228891	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228892	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228893	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228894	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228895	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228896	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228897	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surface_228898	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative C: Mitigated Case

Block 12, Level 3: PH 1a casino clerestory

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	15 ft
Zoning	Custom	Plenum Height	1 ft
Number of Zones	1	Number of Floors	1
Number of Facades	9		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	0	Pt. 1	28.8	-1699.9
Y	0	Pt. 2	17.2	-1734.3
Z	34	Pt. 3	16.3	-1745.0
		Pt. 4	-499.2	-1745.2
		Pt. 5	-454.5	-1699.9
		Pt. 6	-50.3	-1699.9
		Pt. 7	-50.3	-1715.0
		Pt. 8	9.7	-1715.0
		Pt. 9	9.7	-1699.9

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_228890	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228891	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228892	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228893	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228894	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228895	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228896	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228897	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_228898	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative C: Base Case

Block 13, Level 3: PH 2 lvl2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	12	Number of Floors	1
Number of Facades	27		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	249	Pt. 1	76.7	-1840.2
Y	-1735	Pt. 2	134.3	-1819.2
Z	72	Pt. 3	150.2	-1849.5
		Pt. 4	177.5	-1877.2
		Pt. 5	218.5	-1897.5
		Pt. 6	276.6	-1900.1
		Pt. 7	277.9	-1907.6
		Pt. 8	281.9	-1929.3
		Pt. 9	286.9	-1956.6
		Pt. 10	289.0	-1956.3
		Pt. 11	292.1	-1991.7
		Pt. 12	273.6	-1993.7
		Pt. 13	273.5	-1992.1
		Pt. 14	265.1	-1992.7
		Pt. 15	266.6	-2017.0
		Pt. 16	191.0	-2017.0
		Pt. 17	191.0	-2008.2
		Pt. 18	127.8	-2008.2
		Pt. 19	127.8	-1992.9
		Pt. 20	71.7	-1951.6
		Pt. 21	71.7	-1957.0
		Pt. 22	-53.0	-1957.0
		Pt. 23	-53.4	-1833.0
		Pt. 24	11.0	-1833.0
		Pt. 25	11.0	-1775.0
		Pt. 26	62.5	-1775.0
		Pt. 27	70.3	-1822.4

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	rf Z5 NR 90.1-07	0.048	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_270336	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270337	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270338	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270339	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270340	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270341	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270342	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270352	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270353	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270371	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270372	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative C: Mitigated Case

Block 13, Level 3: PH 2 lvl2

Block Information		Ceiling and Plenum Heights	
Shape	CUSTOMBLK	Floor to Floor Height	13 ft
Zoning	Custom	Plenum Height	4 ft
Number of Zones	12	Number of Floors	1
Number of Facades	27		

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	249	Pt. 1	76.7	-1850.2
Y	-1745	Pt. 2	134.3	-1829.2
Z	72	Pt. 3	150.2	-1859.5
		Pt. 4	177.5	-1887.2
		Pt. 5	218.5	-1907.5
		Pt. 6	276.6	-1910.1
		Pt. 7	277.9	-1917.6
		Pt. 8	281.9	-1939.3
		Pt. 9	286.9	-1966.6
		Pt. 10	289.0	-1966.3
		Pt. 11	292.1	-2001.7
		Pt. 12	273.6	-2003.7
		Pt. 13	273.5	-2002.1
		Pt. 14	265.1	-2002.7
		Pt. 15	266.6	-2027.0
		Pt. 16	191.0	-2027.0
		Pt. 17	191.0	-2018.2
		Pt. 18	127.8	-2018.2
		Pt. 19	127.8	-2002.9
		Pt. 20	71.7	-1961.6
		Pt. 21	71.7	-1967.0
		Pt. 22	-53.0	-1967.0
		Pt. 23	-53.4	-1843.0
		Pt. 24	11.0	-1843.0
		Pt. 25	11.0	-1785.0
		Pt. 26	62.5	-1785.0
		Pt. 27	70.3	-1832.4

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_270155	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270156	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270157	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270158	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270159	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270160	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270161	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270192	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270193	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270221	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270222	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative C: Base Case

Surf_270373	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270374	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270375	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270378	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270380	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270382	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270385	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270386	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270387	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270388	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270389	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270390	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270391	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270392	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270393	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270394	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative C: Mitigated Case

Surface_270223	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270224	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270225	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270228	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270230	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270232	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270235	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270236	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270237	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270238	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270239	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270240	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270241	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270242	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270243	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270244	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative C: Base Case

Block 14, Level 3: PH 3 lvl2

Block Information	
Shape	CUSTOMBLK
Zoning	Custom
Number of Zones	7
Number of Facades	40

Ceiling and Plenum Heights	
Floor to Floor Height	13 ft
Plenum Height	4 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	249.75	Pt. 1	287.55	-1905.42
Y	-1734.52	Pt. 2	332.65	-1906.72
Z	72	Pt. 3	377.35	-1915.52
		Pt. 4	420.15	-1932.42
		Pt. 5	415.85	-1941.42
		Pt. 6	453.35	-1964.72
		Pt. 7	447.35	-1972.72
		Pt. 8	460.45	-1983.02
		Pt. 9	478.25	-2000.52
		Pt. 10	472.05	-2007.52
		Pt. 11	488.35	-2027.12
		Pt. 12	505.95	-2054.12
		Pt. 13	518.35	-2079.52
		Pt. 14	529.35	-2113.62
		Pt. 15	519.85	-2115.82
		Pt. 16	519.85	-2157.52
		Pt. 17	434.15	-2157.52
		Pt. 18	430.15	-2134.52
		Pt. 19	422.45	-2112.92
		Pt. 20	412.55	-2095.22
		Pt. 21	398.25	-2077.22
		Pt. 22	380.75	-2061.82
		Pt. 23	367.05	-2053.02
		Pt. 24	345.75	-2053.02
		Pt. 25	345.75	-2033.22
		Pt. 26	324.25	-2033.22
		Pt. 27	324.25	-2038.02
		Pt. 28	306.05	-2037.62
		Pt. 29	292.15	-2033.12
		Pt. 30	275.15	-2021.82
		Pt. 31	270.15	-2016.52
		Pt. 32	267.35	-2016.52
		Pt. 33	265.85	-1992.22
		Pt. 34	274.25	-1991.62
		Pt. 35	274.35	-1993.22
		Pt. 36	292.85	-1991.22
		Pt. 37	289.75	-1955.82
		Pt. 38	287.65	-1956.12
		Pt. 39	282.65	-1928.82
		Pt. 40	278.65	-1907.12

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Alternative C: Mitigated Case

Block 14, Level 3: PH 3 lvl2

Block Information	
Shape	CUSTOMBLK
Zoning	Custom
Number of Zones	7
Number of Facades	40

Ceiling and Plenum Heights	
Floor to Floor Height	13 ft
Plenum Height	4 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Point	X (ft)	Y (ft)
X	249.75	Pt. 1	287.55	-1905.42
Y	-1734.52	Pt. 2	332.65	-1906.72
Z	72	Pt. 3	377.35	-1915.52
		Pt. 4	420.15	-1932.42
		Pt. 5	415.85	-1941.42
		Pt. 6	453.35	-1964.72
		Pt. 7	447.35	-1972.72
		Pt. 8	460.45	-1983.02
		Pt. 9	478.25	-2000.52
		Pt. 10	472.05	-2007.52
		Pt. 11	488.35	-2027.12
		Pt. 12	505.95	-2054.12
		Pt. 13	518.35	-2079.52
		Pt. 14	529.35	-2113.62
		Pt. 15	519.85	-2115.82
		Pt. 16	519.85	-2157.52
		Pt. 17	434.15	-2157.52
		Pt. 18	430.15	-2134.52
		Pt. 19	422.45	-2112.92
		Pt. 20	412.55	-2095.22
		Pt. 21	398.25	-2077.22
		Pt. 22	380.75	-2061.82
		Pt. 23	367.05	-2053.02
		Pt. 24	345.75	-2053.02
		Pt. 25	345.75	-2033.22
		Pt. 26	324.25	-2033.22
		Pt. 27	324.25	-2038.02
		Pt. 28	306.05	-2037.62
		Pt. 29	292.15	-2033.12
		Pt. 30	275.15	-2021.82
		Pt. 31	270.15	-2016.52
		Pt. 32	267.35	-2016.52
		Pt. 33	265.85	-1992.22
		Pt. 34	274.25	-1991.62
		Pt. 35	274.35	-1993.22
		Pt. 36	292.85	-1991.22
		Pt. 37	289.75	-1955.82
		Pt. 38	287.65	-1956.12
		Pt. 39	282.65	-1928.82
		Pt. 40	278.65	-1907.12

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	MC Roof	0.034	0.9
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Alternative C: Base Case

VisualDOE 4.1 - Architectural Details **April 3, 2014**

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_270395	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270396	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270397	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270398	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270399	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270400	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270403	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270404	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270411	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270412	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270413	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270414	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270415	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270416	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270417	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270424	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270425	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270426	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270427	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270428	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270429	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270430	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270431	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270432	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270441	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270442	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270443	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270444	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270445	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270446	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270447	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270448	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270449	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270450	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270452	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270453	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270454	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270455	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270456	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2
Surf_270457	n.a.	n.a.	n.a.	n.a.	wl Z5 NR 90.1-07	0.064	0.2

Alternative C: Mitigated Case

VisualDOE 4.1 - Architectural Details **April 3, 2014**

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surface_270245	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270246	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270247	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270248	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270249	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270250	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270253	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270254	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270276	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270277	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270278	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270279	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270280	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270281	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270282	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270302	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270303	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270304	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270305	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270306	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270307	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270308	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270309	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270310	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270319	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270320	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270321	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270322	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270323	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270324	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270325	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270326	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270327	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270328	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270330	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270331	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270332	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270333	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270334	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surface_270335	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative C: Base Case

Block 15, Level 1: Kitchen MAU

Block Information	
Shape	Rect
Zoning	Single
Zone Depth	10 ft
Number of Zones	2
Number of Facades	4

Ceiling and Plenum Heights	
Floor to Floor Height	13 ft
Plenum Height	4 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Widths (ft)		Depths (ft)	
X	-2000	Width	1	Depth	1
Y	0				
Z	0				

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	~Adiabatic Roof	0.001	1.5
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_395826	n.a.	n.a.	n.a.	n.a.	int wall	0.001	5.3
Surf_395827	n.a.	n.a.	n.a.	n.a.	int wall	0.001	5.3
Surf_395828	n.a.	n.a.	n.a.	n.a.	int wall	0.001	5.3
Surf_395829	n.a.	n.a.	n.a.	n.a.	int wall	0.001	5.3

Alternative C: Mitigated Case

Block 15, Level 1: Kitchen MAU

Block Information	
Shape	Rect
Zoning	Single
Zone Depth	10 ft
Number of Zones	2
Number of Facades	4

Ceiling and Plenum Heights	
Floor to Floor Height	13 ft
Plenum Height	4 ft
Number of Floors	1

Block Dimensions

Coordinates (ft)		Widths (ft)		Depths (ft)	
X	-2000	Width	1	Depth	1
Y	0				
Z	0				

Block Constructions

Construction	Description	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Roof	~Adiabatic Roof	0.001	1.5
Ceiling	Gyp. bd. ceiling	0.745	0.5
Floor	Simulated Slab	0.025	45.6
Int. Floor	Int Floor	0.182	9.3
Interior Wall	Partition	0.387	1.0

Facade Dimensions

Name	Bay Width (ft)	Window Height (ft)	Window Width (ft)

Facade Shading

Name	Window Recess (ft)	Interior Shading	Exterior Shading	Overhang Distance (ft)	Overhang Projection (ft)	Side Fin Distance (ft)	Side Fin Projection (ft)

Facade Constructions

Name	Window Construction	U-Factor (Btu/h-ft²-°F)	SC	VLT	Wall Construction	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)
Surf_400392	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surf_400393	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surf_400394	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2
Surf_400395	n.a.	n.a.	n.a.	n.a.	MC Wall	0.037	0.2

Alternative C: Base Case

VisualDOE 4.1 - Architectural Summary **April 3, 2014**

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt C Base Case
Case Description: Ph1a b 2 3
Gross Area: 2,240,880 ft²
Conditioned Area: 1,074,639 ft²
Window-Wall-Ratio: 12.9%
Skylight-Roof-Ratio: 0.0%
Number of Blocks: 15
Note: This report includes floor multipliers

Occupancies Summary

Name	Area (ft²)	Avg. LPD (W/ft²)	Avg. EPD (W/ft²)
Office	300,942	1.0	0.85
Hotel	374,530	1.0	0.5
Casino Gaming	139,878	1.6	10.0
Restaurant	92,710	1.6	0.79
Garage	1,166,241	0.3	0.2
Retail	8,572	1.6	1.0
Assembly	158,006	1.2	0.25
Restaurant VAV	1	1.6	0.79
Building Totals & Averages	2,240,880	0.71	0.98

Constructions Summary

Name	Net Area (ft²)	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)	Absorptance	Type	Category	Layers
Simulated Slab	984,633	0.03	45.6	0.0	Slabs	Light	3
Partition	330,012	0.39	1.04	0.3	Partitions	Light	3
Gyp. bd. ceiling	1,503,874	0.74	0.52	0.7	Ceilings	Light	1
Int Floor	5,061,586	0.18	9.33	0.7	Floors	Light	3
wl Z5 NR 90.1-07	568,497	0.06	0.2	0.7	Walls	Light	n.a.
rf Z5 NR 90.1-07	1,138,531	0.05	0.93	0.7	Roofs	Light	n.a.
int wall	52	0.0	5.33	0.0	Walls	Light	n.a.
MC Roof	34,626	0.03	0.93	0.55	Roofs	Light	n.a.

Fenestrations Summary

Name	Ucog (Btu/h-ft²-°F)	SHGC	Tvis	North (ft²)	East (ft²)	South (ft²)	West (ft²)	Total (ft²)	No.
Hotel window	0.550	0.404	0.700	2,970	23,760	2,970	23,760	53,460	2160
7.5ft	0.450	0.353	0.700	7,688	3,675	7,013	4,800	23,175	618
Building Totals & Averages	0.520	0.389	0.700	10,658	27,435	9,983	28,560	76,635	2,778

Alternative C: Mitigated Case

VisualDOE 4.1 - Architectural Summary **April 3, 2014**

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt C Design Case
Case Description: Ph1a b 2 3
Gross Area: 2,240,880 ft²
Conditioned Area: 1,074,639 ft²
Window-Wall-Ratio: 12.9%
Skylight-Roof-Ratio: 0.0%
Number of Blocks: 15
Note: This report includes floor multipliers

Occupancies Summary

Name	Area (ft²)	Avg. LPD (W/ft²)	Avg. EPD (W/ft²)
Office	300,942	1.0	0.85
Casino Gaming	139,878	1.6	10.0
Restaurant	92,711	1.6	0.79
Garage	1,166,241	0.3	0.2
Retail	8,572	1.6	1.0
Assembly	158,006	1.2	0.25
HtlRoomCtrl	374,530	0.5	0.5
Building Totals & Averages	2,240,880	0.63	0.98

Constructions Summary

Name	Net Area (ft²)	U-Factor (Btu/h-ft²-°F)	HC (Btu/ft²-°F)	Absorptance	Type	Category	Layers
garage rf	280,634	0.25	10.62	0.7	Roofs	Light	4
Simulated Slab	982,539	0.03	45.6	0.0	Slabs	Light	3
Partition	330,012	0.39	1.04	0.3	Partitions	Light	3
Gyp. bd. ceiling	1,503,874	0.74	0.52	0.7	Ceilings	Light	1
Int Floor	5,036,266	0.18	9.33	0.7	Floors	Light	3
MC Wall	568,549	0.04	0.2	0.7	Walls	Light	n.a.
MC Roof	902,893	0.03	0.93	0.55	Roofs	Light	n.a.

Fenestrations Summary

Name	Ucog (Btu/h-ft²-°F)	SHGC	Tvis	North (ft²)	East (ft²)	South (ft²)	West (ft²)	Total (ft²)	No.
Hotel window	0.550	0.404	0.700	2,970	23,760	2,970	23,760	53,460	2160
7.5ft	0.450	0.353	0.700	7,688	3,675	7,013	4,800	23,175	618
Building Totals & Averages	0.520	0.389	0.700	10,658	27,435	9,983	28,560	76,635	2,778

Alternative C: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt C Base Case
Case Description: Ph1a b 2 3
Number of Blocks: 15

Zone Loads

Name	Area (ft²)	LPD (W/ft²)	EPD (W/ft²)	Occupancy	Occupant Density (ft²/person)	Daylight Control	Illuminance (fc)	Control Fraction	Infiltration (ach)	SS-G Max Cl/Ht (kBtu/h)
Room_0120 htl	88200	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_6005 toilet 17	7343	1.20	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./65.34
Room_7000 office 17	4828	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./55.19
Room_7001 office 8	12027	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./80.86
Room_7002 office 8	16059	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./108.15
Room_7003 office 6	10766	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./79.86
Room_7004 office 5	6124	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./53.6
Room_7005 office 5	495	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./8.22
Room_7006 office 6	1776	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./64.25
Room_7007 office 5	1256	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./45.15
Room_7008 office 6	742	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./26.7
Room_7009 office 5	1075	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./42.48
Room_7011 corr 14	9115	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./80.07
Room_7013 office 18	2094	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./22.91
Room_7012 locker 7	3219	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./38.14
Room_7014 office 1	25237	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./144.53
Room_7015 office 2	9696	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./47.82
Room_7016 storage	12364	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./71.56
Room_7017 office 2	2611	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./67.01
Room_7018 Office 52	2607	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./55.17
Room_7019 office 52	12246	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./96.13
Room_7020 office 52	1662	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./41.59
Room_7021 office 52	1745	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./22.85
Room_7022 office 14	2199	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./70.8
Room_7023 office 51	6052	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./48.01
Room_9001 uncond	3096	.00	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9002 ph1 garage PL	498436	.30	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.

Alternative C: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt C Design Case
Case Description: Ph1a b 2 3
Number of Blocks: 15

Zone Loads

Name	Area (ft²)	LPD (W/ft²)	EPD (W/ft²)	Occupancy	Occupant Density (ft²/person)	Daylight Control	Illuminance (fc)	Control Fraction	Infiltration (ach)	SS-G Max Cl/Ht (kBtu/h)
Room_0120 htl	88200	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	68.5/33.27
Room_6005 toilet 17	7343	.95	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./111.64
Room_7000 office 17	4828	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./82.57
Room_7001 office 8	12027	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./171.38
Room_7002 office 8	16059	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./228.09
Room_7003 office 6	10766	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./159.72
Room_7004 office 5	6124	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./101.77
Room_7005 office 5	495	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./11.52
Room_7006 office 6	1776	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./69.5
Room_7007 office 5	1256	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./49.07
Room_7008 office 6	742	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./28.15
Room_7009 office 5	1075	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./45.37
Room_7011 corr 14	9115	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./152.83
Room_7013 office 18	2094	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./33.6
Room_7012 locker 7	3219	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./57.27
Room_7014 office 1	25237	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./296.9
Room_7015 office 2	9696	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./111.79
Room_7016 storage	12364	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./139.63
Room_7017 office 2	2611	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./75.69
Room_7018 Office 52	2607	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./69.96
Room_7019 office 52	12246	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./195.11
Room_7020 office 52	1662	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./48.45
Room_7021 office 52	1745	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./33.09
Room_7022 office 14	2199	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./75.79
Room_7023 office 51	6052	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./99.81
Room_8006 BOH 36 PL	4925	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./64.82
Room_8007 BOH 32	1165	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./24.22

Alternative C: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_9003 garage 2	177216	.30	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9004 ph2 garage	468075	.30	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9005 loading	19418	.30	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_7050 47	6524	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./42.23
Room_7051 53-54	3069	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./14.78
Room_7052 53-54	8217	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./26.87
Room_7053 55	10482	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./41.91
Room_7054 56	9444	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./42.46
Room_7055 53-54	1640	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./10.66
Room_7056 53-54	965	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./6.11
Room_7057 53-54	565	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./5.16
Room_7058 56	1015	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./6.22
Room_7059 56	2785	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./16.62
Room_7060 53-54	1631	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./10.79
Room_7061 53-54	870	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./6.69
Room_7062 57	5666	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./38.24
Room_7063 57	10484	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./50.18
Room_7064 58	3495	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./23.45
Room_7065 58	9778	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./42.37
Room_7066 58	1079	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./9.36
Room_7067 57	2448	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./15.95
Room_7068 58	1677	.90	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./13.56
Room_8015 BOH 50	1910	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./18.92
Room_8014 BOH 50	675	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./10.68
Room_8013 BOH 50	3369	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./31.97
Room_8012 BOH 50	1910	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./73.64
Room_8011 BOH 50	675	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./10.73
Room_8010 BOH 40	4661	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./44.37
Room_8009 BOH 32	11617	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./87.42
Room_8008 BOH 32	2601	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./34.36
Room_8007 BOH 32	1165	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./16.27
Room_8006 BOH 36	4925	1.00	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./41.13
Room_6000 casino slots	72747	1.60	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./n.a.
Room_6004 casino cs	21617	.00	.00	Casino Gaming	100000.0	None	n.a.	n.a.	0.2	n.a./425.44
Room_6001 casino	1151	1.60	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./54.2
Room_6002 casino	1963	1.60	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./76.9
Room_6003 casino	64018	1.60	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./n.a.
Room_5021 bar 31	6046	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./288.46
Room_5020 restaurant 48	1850	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./233.99
Room_5019 restaurant 48	1125	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./158.12

Alternative C: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_8008 BOH 32	2601	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./51.76
Room_8009 BOH 32	11617	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./178.47
Room_8010 BOH 40	4661	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./71.86
Room_8011 BOH 50	675	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./15.26
Room_8012 BOH 50	1910	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./79.1
Room_8013 BOH 50	3369	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./61.2
Room_8014 BOH 50	675	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./15.07
Room_8015 BOH 50	1910	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./37.56
Room_9001 uncond	3096	.00	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9002 ph1 garage PL	498436	.10	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9003 garage 2	177216	.10	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9004 ph2 garage	468075	.10	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_9005 loading	19418	.10	.20	Garage	100000.0	None	n.a.	n.a.	0.2	n.a.
Room_7067 47	6524	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./75.96
Room_7068 53-54	3069	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./33.94
Room_7050 53-54	8217	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./74.11
Room_7051 55	10482	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./97.19
Room_7052 56	9444	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./90.84
Room_7053 53-54	1640	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./17.67
Room_7054 53-54	965	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./10.53
Room_7055 53-54	565	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./8.33
Room_7056 53-54	1015	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./10.9
Room_7057 56	2785	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./28.09
Room_7058 53-54	1631	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./17.66
Room_7059 53-54	870	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./11.25
Room_7060 57	5666	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./60.4
Room_7061 57	10484	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./102.16
Room_7062 58	3495	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./39.95
Room_7063 58	9778	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./92.1
Room_7064 58	1079	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./13.1
Room_7065 57	2448	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./26.55
Room_7066 58	1677	.80	.85	Office	200.0	None	n.a.	n.a.	0.2	n.a./20.73
Room_6000 casino slots	72747	1.28	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./n.a.
Room_6004 casino cs	21617	.00	.00	Casino Gaming	100000.0	None	n.a.	n.a.	0.2	n.a./427.5
Room_6001 casino	1151	1.28	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./29.68
Room_6002 casino	1963	1.28	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./98.5
Room_6003 casino	64018	1.28	10.00	Casino Gaming	8.3	None	n.a.	n.a.	0.2	n.a./819.55
Room_5021 bar 31	6046	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./554.39
Room_5020 restaurant 48	1850	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./361.76

Alternative C: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_5018 restaurant 48	1612	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./147.46
Room_5017 restaurant 48	3528	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./187.03
Room_5016 kitchen 49	2677	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./142.52
Room_5015 coffee 38	8098	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./422.52
Room_5014 lounge 31	827	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./105.76
Room_5013 lounge 31	2474	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./126.47
Room_5012 kitchen 34	4112	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./206.84
Room_5011 dining 35	7119	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./327.52
Room_5010 dining 33	9722	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./477.04
Room_5009 dining 33	545	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./37.51
Room_5008 food court 13	5479	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./268.53
Room_5007 buffet 10	11243	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./548.05
Room_5006 dining 9	2977	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./158.43
Room_5005 kitchen 11	5739	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./291.2
Room_5004 kitchen 11	720	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./44.68
Room_5003 kitchen 11 PL2	1358	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./73.49
Room_5002 kitchen 12 PL	5231	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./241.13
Room_5001 rest 9	1578	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./146.53
Room_5000 bar 16	8650	1.60	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./376.69
Room_3002 retail 18	296	1.50	1.00	Retail	300.0	None	n.a.	n.a.	0.2	n.a./15.47
Room_3001 retail 18	5275	1.50	1.00	Retail	300.0	None	n.a.	n.a.	0.2	n.a./254.49
Room_3000 Retail 18	3001	1.50	1.00	Retail	300.0	None	n.a.	n.a.	0.2	n.a./249.43
Room_8000 mech	2372	1.00	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./37.16
Room_8001 mech	1226	1.00	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./22.9
Room_8002 mech	1114	1.00	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./16.85
Room_8003 mech	22676	1.00	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./304.02
Room_8004 mech	4282	1.00	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./50.1
Room_8005 mech 14	597	1.00	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./13.23
Room_1000 corr 45-46	16248	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1673.21
Room_1002 circ 44	881	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./61.21
Room_1004 circ 44	5378	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./325.97
Room_1005 circ 44	6548	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./573.22
Room_1006 circ 44	2585	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./183.28
Room_1007 warehouse 4	22440	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1315.8
Room_1008 banquet 36	4573	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./275.82
Room_1009 lobby 15	9429	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./644.44

Alternative C: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_5019 restaurant 48	1125	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./232.14
Room_5018 restaurant 48	1612	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./195.9
Room_5017 restaurant 48	3528	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./324.25
Room_5016 kitchen 49	2677	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./246.77
Room_5015 coffee 38	8098	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./718.05
Room_5014 lounge 31	827	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./158.09
Room_5013 lounge 31	2474	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./228.08
Room_5012 kitchen 34	4112	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./371.68
Room_5011 dining 35	7119	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./613.01
Room_5010 dining 33	9722	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./891.41
Room_5009 dining 33	545	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./52.76
Room_5008 food court 13	5479	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./482.74
Room_5007 buffet 10	11243	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./1032.4
Room_5006 dining 9	2977	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./280.82
Room_5005 kitchen 11	5739	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./527.54
Room_5004 kitchen 11	720	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./67.92
Room_5003 kitchen 11 PL2	1358	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./125.68
Room_5002 kitchen 12 PL	5231	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./446.45
Room_5001 rest 9	1578	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./201.39
Room_5000 bar 16	8650	1.30	.79	Restaurant	14.0	None	n.a.	n.a.	0.2	n.a./740.53
Room_3002 retail 18	296	1.20	1.00	Retail	300.0	None	n.a.	n.a.	0.2	n.a./13.62
Room_3001 retail 18	5275	1.20	1.00	Retail	300.0	None	n.a.	n.a.	0.2	n.a./233.85
Room_3000 Retail 18	3001	1.20	1.00	Retail	300.0	None	n.a.	n.a.	0.2	n.a./240.63
Room_8000 mech	2372	.80	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./11.1
Room_8001 mech	1226	.80	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./8.87
Room_8002 mech	1114	.80	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./5.07
Room_8003 mech	22676	.80	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./36.61
Room_8004 mech	4282	.80	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./1.87
Room_8005 mech 14	597	.80	.75	Office	275.0	None	n.a.	n.a.	0.2	n.a./4.48
Room_1000 corr 45-46	16248	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1636.39
Room_1002 circ 44	881	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./55.91
Room_1004 circ 44	5378	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./311.62
Room_1005 circ 44	6548	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./558.93
Room_1006 circ 44	2585	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./164.14
Room_1007 warehouse 4	22440	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1267.8
Room_1008 banquet 36	4573	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./263.07

Alternative C: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_1010 corr 37	7067	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./437.83
Room_1011 corr 37	4712	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./331.55
Room_1012 circ 19	11138	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./681.5
Room_1013 circ 39	8982	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./531.51
Room_1015 BOH 3	10369	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./656.18
Room_1016 warehouse	18589	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1105.84
Room_1017 BOH 40	2648	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./165.09
Room_1018 BOH 40	2007	1.20	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./136.76
Room_0121 htl	9000	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0122 htl	40578	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0123 htl	40476	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0124 htl	9011	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0126 htl	88202	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0127 htl	40578	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0128 htl	40476	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0129 htl	9011	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_0130 htl	9000	1.00	.50	Hotel	200.0	None	n.a.	n.a.	0.2	n.a./n.a.
Room_1014 meeting 40	8556	1.20	.75	Assembly	8.0	None	n.a.	n.a.	0.2	n.a./1143.31
Room_1003 meeting 41-43	15860	1.20	.75	Assembly	8.0	None	n.a.	n.a.	0.2	n.a./2119.37
Kitchen MAU	1	.00	.00	Restaurant VAV	1000.0	None	n.a.	n.a.	0.2	n.a./3143.03

Supply Air

Name	Total Flow (cfm)	Flow/Area (cfm/ft²)	Air change/hour	Min. Flow Ratio	Cool/Heat Cap. (kBtu/hr)
Room_0120 htl	AutoSized - 5680	0	0	1	n.a.
Room_6005 toilet 17	AutoSized - 7835	0	0	0.3	n.a. / 528.9
Room_7000 office 17	AutoSized - 6025	0	0	0.3	n.a. / 406.7
Room_7001 office 8	AutoSized - 11527	0	0	0.3	n.a. / 778.1
Room_7002 office 8	AutoSized - 14696	0	0	0.3	n.a. / 992.0
Room_7003 office 6	AutoSized - 10242	0	0	0.3	n.a. / 691.3
Room_7004 office 5	AutoSized - 6015	0	0	0.3	n.a. / 406.0
Room_7005 office 5	AutoSized - 565	0	0	0.3	n.a. / 38.2
Room_7006 office 6	AutoSized - 3992	0	0	0.3	n.a. / 269.4
Room_7007 office 5	AutoSized - 1864	0	0	0.3	n.a. / 125.8
Room_7008 office 6	AutoSized - 1903	0	0	0.3	n.a. / 128.4
Room_7009 office 5	AutoSized - 2378	0	0	0.3	n.a. / 160.5
Room_7011 corr 14	AutoSized - 8620	0	0	0.3	n.a. / 581.8
Room_7013 office 18	AutoSized - 1895	0	0	0.3	n.a. / 127.9
Room_7012 locker 7	AutoSized - 3143	0	0	0.3	n.a. / 212.2
Room_7014 office 1	AutoSized - 22112	0	0	0.3	n.a. / 1492.6
Room_7015 office 2	AutoSized - 8413	0	0	0.3	n.a. / 567.9

Alternative C: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_1009 lobby 15	9429	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./625.33
Room_1010 corr 37	7067	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./424.77
Room_1011 corr 37	4712	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./304.36
Room_1012 circ 19	11138	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./656.82
Room_1013 circ 39	8982	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./511.42
Room_1015 BOH 3	10369	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./635.57
Room_1016 warehouse	18589	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./1066.57
Room_1017 BOH 40	2648	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./159.63
Room_1018 BOH 40	2007	.96	.75	Assembly	30.0	None	n.a.	n.a.	0.2	n.a./130.74
Room_0121 htl	9000	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	17.74/18.08
Room_0122 htl	40578	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	90.84/55.33
Room_0123 htl	40476	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	67.74/69.44
Room_0124 htl	9011	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	8.39/9.23
Room_0126 htl	88202	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	70.5/23.97
Room_0127 htl	40578	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	91.64/61.69
Room_0128 htl	40476	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	68.11/68.64
Room_0129 htl	9011	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	15.14/15.36
Room_0130 htl	9000	.90	.50	HtlRoomCtrl	200.0	None	n.a.	n.a.	0.2	8.44/10.51
Room_1003 meeting 41-43	15860	.96	.75	Assembly	8.0	None	n.a.	n.a.	0.2	n.a./2119.37
Room_1014 meeting 40	8556	.96	.75	Assembly	8.0	None	n.a.	n.a.	0.2	n.a./1143.31
Kitchen MAU	1	.00	.00	Restaurant	1000.0	None	n.a.	n.a.	0.2	n.a./3145.11

Supply Air

Name	Total Flow (cfm)	Flow/Area (cfm/ft²)	Air change/hour	Min. Flow Ratio	Cool/Heat Cap. (kBtu/hr)
Room_0120 htl	AutoSized - 5361	0	0	1	225.3 / 289.1
Room_6005 toilet 17	AutoSized - 7370	0	0	0.3	n.a. / 497.5
Room_7000 office 17	AutoSized - 5815	0	0	0.3	n.a. / 392.5
Room_7001 office 8	AutoSized - 11127	0	0	0.3	n.a. / 751.1
Room_7002 office 8	AutoSized - 14145	0	0	0.3	n.a. / 954.8
Room_7003 office 6	AutoSized - 9884	0	0	0.3	n.a. / 667.2
Room_7004 office 5	AutoSized - 5808	0	0	0.3	n.a. / 392.0
Room_7005 office 5	AutoSized - 510	0	0	0.3	n.a. / 34.5
Room_7006 office 6	AutoSized - 3848	0	0	0.3	n.a. / 259.8
Room_7007 office 5	AutoSized - 1758	0	0	0.3	n.a. / 118.6
Room_7008 office 6	AutoSized - 1908	0	0	0.3	n.a. / 128.8
Room_7009 office 5	AutoSized - 2287	0	0	0.3	n.a. / 154.4

Alternative C: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_7016 storage	AutoSized - 10537	0	0	0.3	n.a. / 711.2
Room_7017 office 2	AutoSized - 5392	0	0	0.3	n.a. / 364.0
Room_7018 Office 52	AutoSized - 3515	0	0	0.3	n.a. / 237.2
Room_7019 office 52	AutoSized - 11867	0	0	0.3	n.a. / 801.1
Room_7020 office 52	AutoSized - 3282	0	0	0.3	n.a. / 221.6
Room_7021 office 52	AutoSized - 1688	0	0	0.3	n.a. / 113.9
Room_7022 office 14	AutoSized - 3017	0	0	0.3	n.a. / 203.7
Room_7023 office 51	AutoSized - 6039	0	0	0.3	n.a. / 407.6
Room_9001 uncond	unconditioned	0	0	0.3	n.a.
Room_9002 ph1 garage PL	unconditioned	0	0	0.3	n.a.
Room_9003 garage 2	unconditioned	0	0	0.3	n.a.
Room_9004 ph2 garage	unconditioned	0	0	0.3	n.a.
Room_9005 loading	unconditioned	0	0	0.3	n.a.
Room_7050 47	AutoSized - 5560	0	0	0.3	n.a. / 375.3
Room_7051 53-54	AutoSized - 2690	0	0	0.3	n.a. / 181.6
Room_7052 53-54	AutoSized - 6988	0	0	0.3	n.a. / 471.7
Room_7053 55	AutoSized - 8794	0	0	0.3	n.a. / 593.6
Room_7054 56	AutoSized - 7951	0	0	0.3	n.a. / 536.7
Room_7055 53-54	AutoSized - 1521	0	0	0.3	n.a. / 102.7
Room_7056 53-54	AutoSized - 878	0	0	0.3	n.a. / 59.2
Room_7057 53-54	AutoSized - 576	0	0	0.3	n.a. / 38.9
Room_7058 56	AutoSized - 931	0	0	0.3	n.a. / 62.8
Room_7059 56	AutoSized - 2512	0	0	0.3	n.a. / 169.6
Room_7060 53-54	AutoSized - 1515	0	0	0.3	n.a. / 102.3
Room_7061 53-54	AutoSized - 877	0	0	0.3	n.a. / 59.2
Room_7062 57	AutoSized - 4891	0	0	0.3	n.a. / 330.2
Room_7063 57	AutoSized - 8828	0	0	0.3	n.a. / 595.9
Room_7064 58	AutoSized - 3132	0	0	0.3	n.a. / 211.4
Room_7065 58	AutoSized - 8180	0	0	0.3	n.a. / 552.2
Room_7066 58	AutoSized - 1002	0	0	0.3	n.a. / 67.6
Room_7067 57	AutoSized - 2175	0	0	0.3	n.a. / 146.8
Room_7068 58	AutoSized - 1480	0	0	0.3	n.a. / 99.9
Room_8015 BOH 50	AutoSized - 1937	0	0	0.3	n.a. / 130.7
Room_8014 BOH 50	AutoSized - 728	0	0	0.3	n.a. / 49.1
Room_8013 BOH 50	AutoSized - 3358	0	0	0.3	n.a. / 226.7
Room_8012 BOH 50	AutoSized - 4993	0	0	0.3	n.a. / 337.0
Room_8011 BOH 50	AutoSized - 782	0	0	0.3	n.a. / 52.8
Room_8010 BOH 40	AutoSized - 4144	0	0	0.3	n.a. / 279.7
Room_8009 BOH 32	AutoSized - 11578	0	0	0.3	n.a. / 781.5
Room_8008 BOH 32	AutoSized - 2905	0	0	0.3	n.a. / 196.1

Alternative C: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_7011 corr 14	AutoSized - 8290	0	0	0.3	n.a. / 559.6
Room_7013 office 18	AutoSized - 1782	0	0	0.3	n.a. / 120.3
Room_7012 locker 7	AutoSized - 2923	0	0	0.3	n.a. / 197.3
Room_7014 office 1	AutoSized - 21246	0	0	0.3	n.a. / 1434.1
Room_7015 office 2	AutoSized - 8102	0	0	0.3	n.a. / 546.9
Room_7016 storage	AutoSized - 10076	0	0	0.3	n.a. / 680.1
Room_7017 office 2	AutoSized - 5402	0	0	0.3	n.a. / 364.6
Room_7018 Office 52	AutoSized - 3313	0	0	0.3	n.a. / 223.7
Room_7019 office 52	AutoSized - 11464	0	0	0.3	n.a. / 773.8
Room_7020 office 52	AutoSized - 3140	0	0	0.3	n.a. / 211.9
Room_7021 office 52	AutoSized - 1549	0	0	0.3	n.a. / 104.6
Room_7022 office 14	AutoSized - 2839	0	0	0.3	n.a. / 191.6
Room_7023 office 51	AutoSized - 5835	0	0	0.3	n.a. / 393.8
Room_8006 BOH 36 PL	AutoSized - 4129	0	0	0.3	n.a. / 278.7
Room_8007 BOH 32	AutoSized - 1208	0	0	0.3	n.a. / 81.5
Room_8008 BOH 32	AutoSized - 2657	0	0	0.3	n.a. / 179.4
Room_8009 BOH 32	AutoSized - 11192	0	0	0.3	n.a. / 755.5
Room_8010 BOH 40	AutoSized - 3917	0	0	0.3	n.a. / 264.4
Room_8011 BOH 50	AutoSized - 715	0	0	0.3	n.a. / 48.2
Room_8012 BOH 50	AutoSized - 4873	0	0	0.3	n.a. / 329.0
Room_8013 BOH 50	AutoSized - 3246	0	0	0.3	n.a. / 219.1
Room_8014 BOH 50	AutoSized - 680	0	0	0.3	n.a. / 45.9
Room_8015 BOH 50	AutoSized - 1860	0	0	0.3	n.a. / 125.5
Room_9001 uncond	unconditioned	0	0	0.3	n.a.
Room_9002 ph1 garage PL	unconditioned	0	0	0.3	n.a.
Room_9003 garage 2	unconditioned	0	0	0.3	n.a.
Room_9004 ph2 garage	unconditioned	0	0	0.3	n.a.
Room_9005 loading	unconditioned	0	0	0.3	n.a.
Room_7067 47	AutoSized - 5327	0	0	0.3	n.a. / 359.6
Room_7068 53-54	AutoSized - 2550	0	0	0.3	n.a. / 172.1
Room_7050 53-54	AutoSized - 6681	0	0	0.3	n.a. / 451.0
Room_7051 55	AutoSized - 8441	0	0	0.3	n.a. / 569.8
Room_7052 56	AutoSized - 7618	0	0	0.3	n.a. / 514.2
Room_7053 53-54	AutoSized - 1401	0	0	0.3	n.a. / 94.6
Room_7054 53-54	AutoSized - 800	0	0	0.3	n.a. / 54.0

Alternative C: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_8007 BOH 32	AutoSized - 1318	0	0	0.3	n.a. / 89.0
Room_8006 BOH 36	AutoSized - 4311	0	0	0.3	n.a. / 291.0
Room_6000 casino slots	AutoSized - 225563	0	0	1	n.a. / 15225.5
Room_6004 casino cs	AutoSized - 14455	0	0	1	n.a. / 975.7
Room_6001 casino	AutoSized - 5560	0	0	1	n.a. / 375.3
Room_6002 casino	AutoSized - 9705	0	0	1	n.a. / 655.1
Room_6003 casino	AutoSized - 226146	0	0	1	n.a. / 15264.9
Room_5021 bar 31	AutoSized - 9081	0	0	1	n.a. / 613.0
Room_5020 restaurant 48	AutoSized - 5728	0	0	1	n.a. / 386.6
Room_5019 restaurant 48	AutoSized - 3719	0	0	1	n.a. / 251.0
Room_5018 restaurant 48	AutoSized - 3221	0	0	1	n.a. / 217.4
Room_5017 restaurant 48	AutoSized - 5311	0	0	1	n.a. / 358.5
Room_5016 kitchen 49	AutoSized - 4048	0	0	1	n.a. / 273.2
Room_5015 coffee 38	AutoSized - 11788	0	0	1	n.a. / 795.7
Room_5014 lounge 31	AutoSized - 2536	0	0	1	n.a. / 171.2
Room_5013 lounge 31	AutoSized - 3741	0	0	1	n.a. / 252.5
Room_5012 kitchen 34	AutoSized - 6090	0	0	1	n.a. / 411.1
Room_5011 dining 35	AutoSized - 10055	0	0	1	n.a. / 678.7
Room_5010 dining 33	AutoSized - 14602	0	0	1	n.a. / 985.7
Room_5009 dining 33	AutoSized - 908	0	0	1	n.a. / 61.3
Room_5008 food court 13	AutoSized - 7934	0	0	1	n.a. / 535.5
Room_5007 buffet 10	AutoSized - 16911	0	0	1	n.a. / 1141.5
Room_5006 dining 9	AutoSized - 4597	0	0	1	n.a. / 310.3
Room_5005 kitchen 11	AutoSized - 8641	0	0	1	n.a. / 583.3
Room_5004 kitchen 11	AutoSized - 1123	0	0	1	n.a. / 75.8
Room_5003 kitchen 11 PL2	AutoSized - 2063	0	0	1	n.a. / 139.2
Room_5002 kitchen 12 PL	AutoSized - 7342	0	0	1	n.a. / 495.6
Room_5001 rest 9	AutoSized - 3299	0	0	1	n.a. / 222.7
Room_5000 bar 16	AutoSized - 12158	0	0	1	n.a. / 820.7
Room_3002 retail 18	AutoSized - 246	0	0	1	n.a. / 16.6
Room_3001 retail 18	AutoSized - 4047	0	0	1	n.a. / 273.2
Room_3000 Retail 18	AutoSized - 3966	0	0	1	n.a. / 267.7
Room_8000 mech	AutoSized - 1996	0	0	1	n.a. / 134.7
Room_8001 mech	AutoSized - 1185	0	0	1	n.a. / 80.0

Alternative C: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_7055 53-54	AutoSized - 544	0	0	0.3	n.a. / 36.7
Room_7056 53-54	AutoSized - 860	0	0	0.3	n.a. / 58.1
Room_7057 56	AutoSized - 2347	0	0	0.3	n.a. / 158.4
Room_7058 53-54	AutoSized - 1399	0	0	0.3	n.a. / 94.5
Room_7059 53-54	AutoSized - 800	0	0	0.3	n.a. / 54.0
Room_7060 57	AutoSized - 4642	0	0	0.3	n.a. / 313.3
Room_7061 57	AutoSized - 8459	0	0	0.3	n.a. / 571.0
Room_7062 58	AutoSized - 2901	0	0	0.3	n.a. / 195.8
Room_7063 58	AutoSized - 7855	0	0	0.3	n.a. / 530.2
Room_7064 58	AutoSized - 925	0	0	0.3	n.a. / 62.5
Room_7065 57	AutoSized - 2040	0	0	0.3	n.a. / 137.7
Room_7066 58	AutoSized - 1404	0	0	0.3	n.a. / 94.8
Room_6000 casino slots	AutoSized - 222490	0	0	0.3	n.a. / 15018.1
Room_6004 casino cs	AutoSized - 13617	0	0	0.3	n.a. / 919.1
Room_6001 casino	AutoSized - 5531	0	0	0.3	n.a. / 373.3
Room_6002 casino	AutoSized - 9724	0	0	0.3	n.a. / 656.4
Room_6003 casino	AutoSized - 223452	0	0	0.3	n.a. / 15083.0
Room_5021 bar 31	AutoSized - 8816	0	0	0.3	n.a. / 595.1
Room_5020 restaurant 48	AutoSized - 5753	0	0	0.3	n.a. / 388.3
Room_5019 restaurant 48	AutoSized - 3691	0	0	0.3	n.a. / 249.2
Room_5018 restaurant 48	AutoSized - 3115	0	0	0.3	n.a. / 210.3
Room_5017 restaurant 48	AutoSized - 5156	0	0	0.3	n.a. / 348.0
Room_5016 kitchen 49	AutoSized - 3924	0	0	0.3	n.a. / 264.9
Room_5015 coffee 38	AutoSized - 11418	0	0	0.3	n.a. / 770.7
Room_5014 lounge 31	AutoSized - 2514	0	0	0.3	n.a. / 169.7
Room_5013 lounge 31	AutoSized - 3627	0	0	0.3	n.a. / 244.8
Room_5012 kitchen 34	AutoSized - 5910	0	0	0.3	n.a. / 398.9
Room_5011 dining 35	AutoSized - 9748	0	0	0.3	n.a. / 658.0
Room_5010 dining 33	AutoSized - 14175	0	0	0.3	n.a. / 956.8
Room_5009 dining 33	AutoSized - 839	0	0	0.3	n.a. / 56.6
Room_5008 food court 13	AutoSized - 7676	0	0	0.3	n.a. / 518.2
Room_5007 buffet 10	AutoSized - 16417	0	0	0.3	n.a. / 1108.1
Room_5006 dining 9	AutoSized - 4466	0	0	0.3	n.a. / 301.4
Room_5005 kitchen 11	AutoSized - 8389	0	0	0.3	n.a. / 566.2
Room_5004 kitchen 11	AutoSized - 1080	0	0	0.3	n.a. / 72.9
Room_5003 kitchen 11 PL2	AutoSized - 1999	0	0	0.3	n.a. / 134.9
Room_5002 kitchen 12 PL	AutoSized - 7099	0	0	0.3	n.a. / 479.2
Room_5001 rest 9	AutoSized - 3202	0	0	0.3	n.a. / 216.2

Alternative C: Base Case

Room_8002 mech	AutoSized - 1075	0	0	1	n.a. / 72.6
Room_8003 mech	AutoSized - 19193	0	0	1	n.a. / 1295.5
Room_8004 mech	AutoSized - 3608	0	0	1	n.a. / 243.5
Room_8005 mech 14	AutoSized - 615	0	0	1	n.a. / 41.5
Room_1000 corr 45-46	AutoSized - 26607	0	0	0.3	n.a. / 1796.0
Room_1002 circ 44	AutoSized - 973	0	0	0.3	n.a. / 65.7
Room_1004 circ 44	AutoSized - 5183	0	0	0.3	n.a. / 349.9
Room_1005 circ 44	AutoSized - 9115	0	0	0.3	n.a. / 615.3
Room_1006 circ 44	AutoSized - 2914	0	0	0.3	n.a. / 196.7
Room_1007 warehouse 4	AutoSized - 20923	0	0	0.3	n.a. / 1412.3
Room_1008 banquet 36	AutoSized - 4386	0	0	0.3	n.a. / 296.1
Room_1009 lobby 15	AutoSized - 10248	0	0	0.3	n.a. / 691.7
Room_1010 corr 37	AutoSized - 6962	0	0	0.3	n.a. / 470.0
Room_1011 corr 37	AutoSized - 5272	0	0	0.3	n.a. / 355.9
Room_1012 circ 19	AutoSized - 10837	0	0	0.3	n.a. / 731.5
Room_1013 circ 39	AutoSized - 8452	0	0	0.3	n.a. / 570.5
Room_1015 BOH 3	AutoSized - 10434	0	0	0.3	n.a. / 704.3
Room_1016 warehouse	AutoSized - 17585	0	0	0.3	n.a. / 1187.0
Room_1017 BOH 40	AutoSized - 2625	0	0	0.3	n.a. / 177.2
Room_1018 BOH 40	AutoSized - 2175	0	0	0.3	n.a. / 146.8
Room_0121 htl	AutoSized - 1077	0	0	1	n.a.
Room_0122 htl	AutoSized - 5532	0	0	1	n.a.
Room_0123 htl	AutoSized - 5164	0	0	1	n.a.
Room_0124 htl	AutoSized - 602	0	0	1	n.a.
Room_0126 htl	AutoSized - 5700	0	0	1	n.a.
Room_0127 htl	AutoSized - 5630	0	0	1	n.a.
Room_0128 htl	AutoSized - 5118	0	0	1	n.a.
Room_0129 htl	AutoSized - 1291	0	0	1	n.a.
Room_0130 htl	AutoSized - 602	0	0	1	n.a.
Room_1014 meeting 40	AutoSized - 18180	0	0	0.3	n.a. / 1227.2
Room_1003 meeting 41-43	AutoSized - 33701	0	0	0.3	n.a. / 2274.9
Kitchen MAU	AutoSized - 50000	0	0	1	n.a. / 3375.0

Outside Air

Name	Total Flow (cfm)	Flow(cfm)/Person	Air change/hour	Fraction Supply Air
Room_0120 htl	n.a.	11	n.a.	n.a.
Room_6005 toilet 17	n.a.	17	n.a.	n.a.
Room_7000 office 17	n.a.	17	n.a.	n.a.
Room_7001 office 8	n.a.	17	n.a.	n.a.
Room_7002 office 8	n.a.	17	n.a.	n.a.
Room_7003 office 6	n.a.	17	n.a.	n.a.
Room_7004 office 5	n.a.	17	n.a.	n.a.
Room_7005 office 5	n.a.	17	n.a.	n.a.
Room_7006 office 6	n.a.	17	n.a.	n.a.
Room_7007 office 5	n.a.	17	n.a.	n.a.
Room_7008 office 6	n.a.	17	n.a.	n.a.

Alternative C: Mitigated Case

Room_5000 bar 16	AutoSized - 11776	0	0	0.3	n.a. / 794.9
Room_3002 retail 18	AutoSized - 217	0	0	0.3	n.a. / 14.6
Room_3001 retail 18	AutoSized - 3719	0	0	0.3	n.a. / 251.0
Room_3000 Retail 18	AutoSized - 3826	0	0	0.3	n.a. / 258.3
Room_8000 mech	AutoSized - 1917	0	0	0.3	n.a. / 129.4
Room_8001 mech	AutoSized - 1144	0	0	0.3	n.a. / 77.2
Room_8002 mech	AutoSized - 1039	0	0	0.3	n.a. / 70.2
Room_8003 mech	AutoSized - 18274	0	0	0.3	n.a. / 1233.5
Room_8004 mech	AutoSized - 3471	0	0	0.3	n.a. / 234.3
Room_8005 mech 14	AutoSized - 537	0	0	0.3	n.a. / 36.2
Room_1000 corr 45-46	AutoSized - 26021	0	0	0.3	n.a. / 1756.4
Room_1002 circ 44	AutoSized - 889	0	0	0.3	n.a. / 60.0
Room_1004 circ 44	AutoSized - 4955	0	0	0.3	n.a. / 334.5
Room_1005 circ 44	AutoSized - 8888	0	0	0.3	n.a. / 599.9
Room_1006 circ 44	AutoSized - 2610	0	0	0.3	n.a. / 176.2
Room_1007 warehouse 4	AutoSized - 20160	0	0	0.3	n.a. / 1360.8
Room_1008 banquet 36	AutoSized - 4183	0	0	0.3	n.a. / 282.4
Room_1009 lobby 15	AutoSized - 9944	0	0	0.3	n.a. / 671.2
Room_1010 corr 37	AutoSized - 6754	0	0	0.3	n.a. / 455.9
Room_1011 corr 37	AutoSized - 4840	0	0	0.3	n.a. / 326.7
Room_1012 circ 19	AutoSized - 10444	0	0	0.3	n.a. / 705.0
Room_1013 circ 39	AutoSized - 8132	0	0	0.3	n.a. / 548.9
Room_1015 BOH 3	AutoSized - 10107	0	0	0.3	n.a. / 682.2
Room_1016 warehouse	AutoSized - 16960	0	0	0.3	n.a. / 1144.8
Room_1017 BOH 40	AutoSized - 2538	0	0	0.3	n.a. / 171.3
Room_1018 BOH 40	AutoSized - 2079	0	0	0.3	n.a. / 140.3
Room_0121 htl	AutoSized - 1018	0	0	1	41.2 / 51.1
Room_0122 htl	AutoSized - 5470	0	0	1	219.6 / 270.9
Room_0123 htl	AutoSized - 5000	0	0	1	201.4 / 249.3
Room_0124 htl	AutoSized - 562	0	0	1	23.6 / 30.2
Room_0126 htl	AutoSized - 5375	0	0	1	225.8 / 289.7
Room_0127 htl	AutoSized - 5449	0	0	1	218.8 / 270.0
Room_0128 htl	AutoSized - 4983	0	0	1	200.8 / 248.5
Room_0129 htl	AutoSized - 1255	0	0	1	50.2 / 62.0
Room_0130 htl	AutoSized - 562	0	0	1	23.6 / 30.2
Room_1003 meeting 41-43	AutoSized - 33701	0	0	0.3	n.a. / 2274.9
Room_1014 meeting 40	AutoSized - 18180	0	0	0.3	n.a. / 1227.2
Kitchen MAU	AutoSized - 50000	0	0	1	n.a. / 3375.0

Outside Air

Alternative C: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_7009 office 5	n.a.	17	n.a.	n.a.
Room_7011 corr 14	n.a.	17	n.a.	n.a.
Room_7013 office 18	n.a.	17	n.a.	n.a.
Room_7012 locker 7	n.a.	17	n.a.	n.a.
Room_7014 office 1	n.a.	17	n.a.	n.a.
Room_7015 office 2	n.a.	17	n.a.	n.a.
Room_7016 storage	n.a.	17	n.a.	n.a.
Room_7017 office 2	n.a.	17	n.a.	n.a.
Room_7018 Office 52	n.a.	17	n.a.	n.a.
Room_7019 office 52	n.a.	17	n.a.	n.a.
Room_7020 office 52	n.a.	17	n.a.	n.a.
Room_7021 office 52	n.a.	17	n.a.	n.a.
Room_7022 office 14	n.a.	17	n.a.	n.a.
Room_7023 office 51	n.a.	17	n.a.	n.a.
Room_9001 uncond	unconditioned	15	n.a.	n.a.
Room_9002 ph1 garage PL	unconditioned	15	n.a.	n.a.
Room_9003 garage 2	unconditioned	15	n.a.	n.a.
Room_9004 ph2 garage	unconditioned	15	n.a.	n.a.
Room_9005 loading	unconditioned	15	n.a.	n.a.
Room_7050 47	n.a.	17	n.a.	n.a.
Room_7051 53-54	n.a.	17	n.a.	n.a.
Room_7052 53-54	n.a.	17	n.a.	n.a.
Room_7053 55	n.a.	17	n.a.	n.a.
Room_7054 56	n.a.	17	n.a.	n.a.
Room_7055 53-54	n.a.	17	n.a.	n.a.
Room_7056 53-54	n.a.	17	n.a.	n.a.
Room_7057 53-54	n.a.	17	n.a.	n.a.
Room_7058 56	n.a.	17	n.a.	n.a.
Room_7059 56	n.a.	17	n.a.	n.a.
Room_7060 53-54	n.a.	17	n.a.	n.a.
Room_7061 53-54	n.a.	17	n.a.	n.a.
Room_7062 57	n.a.	17	n.a.	n.a.
Room_7063 57	n.a.	17	n.a.	n.a.
Room_7064 58	n.a.	17	n.a.	n.a.
Room_7065 58	n.a.	17	n.a.	n.a.
Room_7066 58	n.a.	17	n.a.	n.a.
Room_7067 57	n.a.	17	n.a.	n.a.
Room_7068 58	n.a.	17	n.a.	n.a.
Room_8015 BOH 50	n.a.	17	n.a.	n.a.
Room_8014 BOH 50	n.a.	17	n.a.	n.a.
Room_8013 BOH 50	n.a.	17	n.a.	n.a.
Room_8012 BOH 50	n.a.	17	n.a.	n.a.
Room_8011 BOH 50	n.a.	17	n.a.	n.a.
Room_8010 BOH 40	n.a.	17	n.a.	n.a.
Room_8009 BOH 32	n.a.	17	n.a.	n.a.
Room_8008 BOH 32	n.a.	17	n.a.	n.a.
Room_8007 BOH 32	n.a.	17	n.a.	n.a.
Room_8006 BOH 36	n.a.	17	n.a.	n.a.
Room_6000 casino slots	n.a.	9	n.a.	n.a.
Room_6004 casino cs	n.a.	10	n.a.	n.a.
Room_6001 casino	n.a.	9	n.a.	n.a.
Room_6002 casino	n.a.	9	n.a.	n.a.
Room_6003 casino	n.a.	9	n.a.	n.a.
Room_5021 bar 31	n.a.	15	n.a.	n.a.
Room_5020 restaurant 48	n.a.	10	n.a.	n.a.
Room_5019 restaurant 48	n.a.	10	n.a.	n.a.
Room_5018 restaurant 48	n.a.	10	n.a.	n.a.
Room_5017 restaurant 48	n.a.	10	n.a.	n.a.
Room_5016 kitchen 49	n.a.	10	n.a.	n.a.
Room_5015 coffee 38	n.a.	10	n.a.	n.a.

Alternative C: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Name	Total Flow (cfm)	Flow(cfm)/Person	Air change/hour	Fraction Supply Air
Room_0120 htl	n.a.	11	n.a.	n.a.
Room_6005 toilet 17	n.a.	17	n.a.	n.a.
Room_7000 office 17	n.a.	17	n.a.	n.a.
Room_7001 office 8	n.a.	17	n.a.	n.a.
Room_7002 office 8	n.a.	17	n.a.	n.a.
Room_7003 office 6	n.a.	17	n.a.	n.a.
Room_7004 office 5	n.a.	17	n.a.	n.a.
Room_7005 office 5	n.a.	17	n.a.	n.a.
Room_7006 office 6	n.a.	17	n.a.	n.a.
Room_7007 office 5	n.a.	17	n.a.	n.a.
Room_7008 office 6	n.a.	17	n.a.	n.a.
Room_7009 office 5	n.a.	17	n.a.	n.a.
Room_7011 corr 14	n.a.	17	n.a.	n.a.
Room_7013 office 18	n.a.	17	n.a.	n.a.
Room_7012 locker 7	n.a.	17	n.a.	n.a.
Room_7014 office 1	n.a.	17	n.a.	n.a.
Room_7015 office 2	n.a.	17	n.a.	n.a.
Room_7016 storage	n.a.	17	n.a.	n.a.
Room_7017 office 2	n.a.	17	n.a.	n.a.
Room_7018 Office 52	n.a.	17	n.a.	n.a.
Room_7019 office 52	n.a.	17	n.a.	n.a.
Room_7020 office 52	n.a.	17	n.a.	n.a.
Room_7021 office 52	n.a.	17	n.a.	n.a.
Room_7022 office 14	n.a.	17	n.a.	n.a.
Room_7023 office 51	n.a.	17	n.a.	n.a.
Room_8006 BOH 36 PL	n.a.	17	n.a.	n.a.
Room_8007 BOH 32	n.a.	17	n.a.	n.a.
Room_8008 BOH 32	n.a.	17	n.a.	n.a.
Room_8009 BOH 32	n.a.	17	n.a.	n.a.
Room_8010 BOH 40	n.a.	17	n.a.	n.a.
Room_8011 BOH 50	n.a.	17	n.a.	n.a.
Room_8012 BOH 50	n.a.	17	n.a.	n.a.
Room_8013 BOH 50	n.a.	17	n.a.	n.a.
Room_8014 BOH 50	n.a.	17	n.a.	n.a.
Room_8015 BOH 50	n.a.	17	n.a.	n.a.
Room_9001 uncond	unconditioned	15	n.a.	n.a.
Room_9002 ph1 garage PL	unconditioned	15	n.a.	n.a.
Room_9003 garage 2	unconditioned	15	n.a.	n.a.
Room_9004 ph2 garage	unconditioned	15	n.a.	n.a.
Room_9005 loading	unconditioned	15	n.a.	n.a.
Room_7067 47	n.a.	17	n.a.	n.a.
Room_7068 53-54	n.a.	17	n.a.	n.a.
Room_7050 53-54	n.a.	17	n.a.	n.a.
Room_7051 55	n.a.	17	n.a.	n.a.
Room_7052 56	n.a.	17	n.a.	n.a.
Room_7053 53-54	n.a.	17	n.a.	n.a.
Room_7054 53-54	n.a.	17	n.a.	n.a.
Room_7055 53-54	n.a.	17	n.a.	n.a.
Room_7056 53-54	n.a.	17	n.a.	n.a.
Room_7057 56	n.a.	17	n.a.	n.a.
Room_7058 53-54	n.a.	17	n.a.	n.a.
Room_7059 53-54	n.a.	17	n.a.	n.a.
Room_7060 57	n.a.	17	n.a.	n.a.
Room_7061 57	n.a.	17	n.a.	n.a.
Room_7062 58	n.a.	17	n.a.	n.a.
Room_7063 58	n.a.	17	n.a.	n.a.
Room_7064 58	n.a.	17	n.a.	n.a.
Room_7065 57	n.a.	17	n.a.	n.a.
Room_7066 58	n.a.	17	n.a.	n.a.
Room_6000 casino slots	n.a.	9	n.a.	n.a.
Room_6004 casino cs	n.a.	10	n.a.	n.a.
Room_6001 casino	n.a.	9	n.a.	n.a.
Room_6002 casino	n.a.	9	n.a.	n.a.

Alternative C: Base Case

Room_5014 lounge 31	n.a.	10	n.a.	n.a.
Room_5013 lounge 31	n.a.	10	n.a.	n.a.
Room_5012 kitchen 34	n.a.	10	n.a.	n.a.
Room_5011 dining 35	n.a.	10	n.a.	n.a.
Room_5010 dining 33	n.a.	10	n.a.	n.a.
Room_5009 dining 33	n.a.	10	n.a.	n.a.
Room_5008 food court 13	n.a.	10	n.a.	n.a.
Room_5007 buffet 10	n.a.	10	n.a.	n.a.
Room_5006 dining 9	n.a.	10	n.a.	n.a.
Room_5005 kitchen 11	n.a.	10	n.a.	n.a.
Room_5004 kitchen 11	n.a.	10	n.a.	n.a.
Room_5003 kitchen 11 PL2	n.a.	10	n.a.	n.a.
Room_5002 kitchen 12 PL	n.a.	10	n.a.	n.a.
Room_5001 rest 9	n.a.	10	n.a.	n.a.
Room_5000 bar 16	n.a.	10	n.a.	n.a.
Room_3002 retail 18	n.a.	15	n.a.	n.a.
Room_3001 retail 18	n.a.	15	n.a.	n.a.
Room_3000 Retail 18	n.a.	15	n.a.	n.a.
Room_8000 mech	n.a.	15	n.a.	n.a.
Room_8001 mech	n.a.	15	n.a.	n.a.
Room_8002 mech	n.a.	15	n.a.	n.a.
Room_8003 mech	n.a.	15	n.a.	n.a.
Room_8004 mech	n.a.	15	n.a.	n.a.
Room_8005 mech 14	n.a.	15	n.a.	n.a.
Room_1000 corr 45-46	n.a.	17	n.a.	n.a.
Room_1002 circ 44	n.a.	17	n.a.	n.a.
Room_1004 circ 44	n.a.	17	n.a.	n.a.
Room_1005 circ 44	n.a.	17	n.a.	n.a.
Room_1006 circ 44	n.a.	17	n.a.	n.a.
Room_1007 warehouse 4	n.a.	17	n.a.	n.a.
Room_1008 banquet 36	n.a.	17	n.a.	n.a.
Room_1009 lobby 15	n.a.	17	n.a.	n.a.
Room_1010 corr 37	n.a.	17	n.a.	n.a.
Room_1011 corr 37	n.a.	17	n.a.	n.a.
Room_1012 circ 19	n.a.	17	n.a.	n.a.
Room_1013 circ 39	n.a.	17	n.a.	n.a.
Room_1015 BOH 3	n.a.	17	n.a.	n.a.
Room_1016 warehouse	n.a.	17	n.a.	n.a.
Room_1017 BOH 40	n.a.	17	n.a.	n.a.
Room_1018 BOH 40	n.a.	17	n.a.	n.a.
Room_0121 htl	n.a.	11	n.a.	n.a.
Room_0122 htl	n.a.	11	n.a.	n.a.
Room_0123 htl	n.a.	11	n.a.	n.a.
Room_0124 htl	n.a.	11	n.a.	n.a.
Room_0126 htl	n.a.	11	n.a.	n.a.
Room_0127 htl	n.a.	11	n.a.	n.a.
Room_0128 htl	n.a.	11	n.a.	n.a.
Room_0129 htl	n.a.	11	n.a.	n.a.
Room_0130 htl	n.a.	11	n.a.	n.a.
Room_1014 meeting 40	n.a.	17	n.a.	n.a.
Room_1003 meeting 41-43	n.a.	17	n.a.	n.a.
Kitchen MAU	50000	n.a.	n.a.	n.a.

Zone Thermostat and Terminal Box

Thermostat	PIU

Alternative C: Mitigated Case

Room_6003 casino	n.a.	9	n.a.	n.a.
Room_5021 bar 31	n.a.	10	n.a.	n.a.
Room_5020 restaurant 48	n.a.	10	n.a.	n.a.
Room_5019 restaurant 48	n.a.	10	n.a.	n.a.
Room_5018 restaurant 48	n.a.	10	n.a.	n.a.
Room_5017 restaurant 48	n.a.	10	n.a.	n.a.
Room_5016 kitchen 49	n.a.	10	n.a.	n.a.
Room_5015 coffee 38	n.a.	10	n.a.	n.a.
Room_5014 lounge 31	n.a.	10	n.a.	n.a.
Room_5013 lounge 31	n.a.	10	n.a.	n.a.
Room_5012 kitchen 34	n.a.	10	n.a.	n.a.
Room_5011 dining 35	n.a.	10	n.a.	n.a.
Room_5010 dining 33	n.a.	10	n.a.	n.a.
Room_5009 dining 33	n.a.	10	n.a.	n.a.
Room_5008 food court 13	n.a.	10	n.a.	n.a.
Room_5007 buffet 10	n.a.	10	n.a.	n.a.
Room_5006 dining 9	n.a.	10	n.a.	n.a.
Room_5005 kitchen 11	n.a.	10	n.a.	n.a.
Room_5004 kitchen 11	n.a.	10	n.a.	n.a.
Room_5003 kitchen 11 PL2	n.a.	10	n.a.	n.a.
Room_5002 kitchen 12 PL	n.a.	10	n.a.	n.a.
Room_5001 rest 9	n.a.	10	n.a.	n.a.
Room_5000 bar 16	n.a.	10	n.a.	n.a.
Room_3002 retail 18	n.a.	15	n.a.	n.a.
Room_3001 retail 18	n.a.	15	n.a.	n.a.
Room_3000 Retail 18	n.a.	15	n.a.	n.a.
Room_8000 mech	n.a.	17	n.a.	n.a.
Room_8001 mech	n.a.	15	n.a.	n.a.
Room_8002 mech	n.a.	15	n.a.	n.a.
Room_8003 mech	n.a.	15	n.a.	n.a.
Room_8004 mech	n.a.	15	n.a.	n.a.
Room_8005 mech 14	n.a.	15	n.a.	n.a.
Room_1000 corr 45-46	n.a.	17	n.a.	n.a.
Room_1002 circ 44	n.a.	17	n.a.	n.a.
Room_1004 circ 44	n.a.	17	n.a.	n.a.
Room_1005 circ 44	n.a.	17	n.a.	n.a.
Room_1006 circ 44	n.a.	17	n.a.	n.a.
Room_1007 warehouse 4	n.a.	17	n.a.	n.a.
Room_1008 banquet 36	n.a.	17	n.a.	n.a.
Room_1009 lobby 15	n.a.	17	n.a.	n.a.
Room_1010 corr 37	n.a.	17	n.a.	n.a.
Room_1011 corr 37	n.a.	17	n.a.	n.a.
Room_1012 circ 19	n.a.	17	n.a.	n.a.
Room_1013 circ 39	n.a.	17	n.a.	n.a.
Room_1015 BOH 3	n.a.	17	n.a.	n.a.
Room_1016 warehouse	n.a.	17	n.a.	n.a.
Room_1017 BOH 40	n.a.	17	n.a.	n.a.
Room_1018 BOH 40	n.a.	17	n.a.	n.a.
Room_0121 htl	n.a.	11	n.a.	n.a.
Room_0122 htl	n.a.	11	n.a.	n.a.
Room_0123 htl	n.a.	11	n.a.	n.a.
Room_0124 htl	n.a.	11	n.a.	n.a.
Room_0126 htl	n.a.	11	n.a.	n.a.

Alternative C: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Name	Type	Throttling Range (°F)	Type	Zone Fan Volume (cfm)	Fan Power (W)
Room_0120 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_6005 toilet 17	Reverse Action	4	No PIU	n.a.	n.a.
Room_7000 office 17	Reverse Action	4	No PIU	n.a.	n.a.
Room_7001 office 8	Reverse Action	4	No PIU	n.a.	n.a.
Room_7002 office 8	Reverse Action	4	No PIU	n.a.	n.a.
Room_7003 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7004 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7005 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7006 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7007 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7008 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7009 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7011 corr 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_7013 office 18	Reverse Action	4	No PIU	n.a.	n.a.
Room_7012 locker 7	Reverse Action	4	No PIU	n.a.	n.a.
Room_7014 office 1	Reverse Action	4	No PIU	n.a.	n.a.
Room_7015 office 2	Reverse Action	4	No PIU	n.a.	n.a.
Room_7016 storage	Reverse Action	4	No PIU	n.a.	n.a.
Room_7017 office 2	Reverse Action	4	No PIU	n.a.	n.a.
Room_7018 Office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7019 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7020 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7021 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7022 office 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_7023 office 51	Reverse Action	4	No PIU	n.a.	n.a.
Room_7050 47	Reverse Action	3	No PIU	n.a.	n.a.
Room_7051 53-54	Reverse Action	3	No PIU	n.a.	n.a.
Room_7052 53-54	Reverse Action	3	No PIU	n.a.	n.a.
Room_7053 55	Reverse Action	3	No PIU	n.a.	n.a.
Room_7054 56	Reverse Action	3	No PIU	n.a.	n.a.
Room_7055 53-54	Reverse Action	3	No PIU	n.a.	n.a.
Room_7056 53-54	Reverse Action	3	No PIU	n.a.	n.a.
Room_7057 53-54	Reverse Action	3	No PIU	n.a.	n.a.
Room_7058 56	Reverse Action	3	No PIU	n.a.	n.a.
Room_7059 56	Reverse Action	3	No PIU	n.a.	n.a.
Room_7060 53-54	Reverse Action	3	No PIU	n.a.	n.a.

Alternative C: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_0127 htl	n.a.	11	n.a.	n.a.
Room_0128 htl	n.a.	11	n.a.	n.a.
Room_0129 htl	n.a.	11	n.a.	n.a.
Room_0130 htl	n.a.	11	n.a.	n.a.
Room_1003 meeting 41-43	n.a.	17	n.a.	n.a.
Room_1014 meeting 40	n.a.	17	n.a.	n.a.
Kitchen MAU	50000	n.a.	n.a.	n.a.

Zone Thermostat and Terminal Box

Name	Thermostat Type	Throttling Range (°F)	PIU Type	Zone Fan Volume (cfm)	Fan Power (W)
Room_0120 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_6005 toilet 17	Reverse Action	4	No PIU	n.a.	n.a.
Room_7000 office 17	Reverse Action	4	No PIU	n.a.	n.a.
Room_7001 office 8	Reverse Action	4	No PIU	n.a.	n.a.
Room_7002 office 8	Reverse Action	4	No PIU	n.a.	n.a.
Room_7003 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7004 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7005 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7006 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7007 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7008 office 6	Reverse Action	4	No PIU	n.a.	n.a.
Room_7009 office 5	Reverse Action	4	No PIU	n.a.	n.a.
Room_7011 corr 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_7013 office 18	Reverse Action	4	No PIU	n.a.	n.a.
Room_7012 locker 7	Reverse Action	4	No PIU	n.a.	n.a.
Room_7014 office 1	Reverse Action	4	No PIU	n.a.	n.a.
Room_7015 office 2	Reverse Action	4	No PIU	n.a.	n.a.
Room_7016 storage	Reverse Action	4	No PIU	n.a.	n.a.
Room_7017 office 2	Reverse Action	4	No PIU	n.a.	n.a.
Room_7018 Office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7019 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7020 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7021 office 52	Reverse Action	4	No PIU	n.a.	n.a.
Room_7022 office 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_7023 office 51	Reverse Action	4	No PIU	n.a.	n.a.
Room_8006 BOH 36 PL	Reverse Action	4	No PIU	n.a.	n.a.
Room_8007 BOH 32	Reverse Action	4	No PIU	n.a.	n.a.

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Alternative C: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_7061 53-54	Reverse Action	3	No PIU	n.a.	n.a.
Room_7062 57	Reverse Action	3	No PIU	n.a.	n.a.
Room_7063 57	Reverse Action	3	No PIU	n.a.	n.a.
Room_7064 58	Reverse Action	3	No PIU	n.a.	n.a.
Room_7065 58	Reverse Action	3	No PIU	n.a.	n.a.
Room_7066 58	Reverse Action	3	No PIU	n.a.	n.a.
Room_7067 57	Reverse Action	3	No PIU	n.a.	n.a.
Room_7068 58	Reverse Action	3	No PIU	n.a.	n.a.
Room_8015 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8014 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8013 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8012 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8011 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8010 BOH 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_8009 BOH 32	Reverse Action	4	No PIU	n.a.	n.a.
Room_8008 BOH 32	Reverse Action	4	No PIU	n.a.	n.a.
Room_8007 BOH 32	Reverse Action	4	No PIU	n.a.	n.a.
Room_8006 BOH 36	Reverse Action	4	No PIU	n.a.	n.a.
Room_6000 casino slots	Reverse Action	4	No PIU	n.a.	n.a.
Room_6004 casino cs	Reverse Action	4	No PIU	n.a.	n.a.
Room_6001 casino	Reverse Action	4	No PIU	n.a.	n.a.
Room_6002 casino	Reverse Action	4	No PIU	n.a.	n.a.
Room_6003 casino	Reverse Action	4	No PIU	n.a.	n.a.
Room_5021 bar 31	Reverse Action	4	No PIU	n.a.	n.a.
Room_5020 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5019 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5018 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5017 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5016 kitchen 49	Reverse Action	4	No PIU	n.a.	n.a.
Room_5015 coffee 38	Reverse Action	4	No PIU	n.a.	n.a.
Room_5014 lounge 31	Reverse Action	4	No PIU	n.a.	n.a.
Room_5013 lounge 31	Reverse Action	4	No PIU	n.a.	n.a.
Room_5012 kitchen 34	Reverse Action	4	No PIU	n.a.	n.a.
Room_5011 dining 35	Reverse Action	4	No PIU	n.a.	n.a.
Room_5010 dining 33	Reverse Action	4	No PIU	n.a.	n.a.
Room_5009 dining 33	Reverse Action	4	No PIU	n.a.	n.a.
Room_5008 food court 13	Reverse Action	4	No PIU	n.a.	n.a.

Alternative C: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_8008 BOH 32	Reverse Action	4	No PIU	n.a.	n.a.
Room_8009 BOH 32	Reverse Action	4	No PIU	n.a.	n.a.
Room_8010 BOH 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_8011 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8012 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8013 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8014 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_8015 BOH 50	Reverse Action	4	No PIU	n.a.	n.a.
Room_7067 47	Reverse Action	4	No PIU	n.a.	n.a.
Room_7068 53-54	Reverse Action	4	No PIU	n.a.	n.a.
Room_7050 53-54	Reverse Action	4	No PIU	n.a.	n.a.
Room_7051 55	Reverse Action	4	No PIU	n.a.	n.a.
Room_7052 56	Reverse Action	4	No PIU	n.a.	n.a.
Room_7053 53-54	Reverse Action	4	No PIU	n.a.	n.a.
Room_7054 53-54	Reverse Action	4	No PIU	n.a.	n.a.
Room_7055 53-54	Reverse Action	4	No PIU	n.a.	n.a.
Room_7056 53-54	Reverse Action	4	No PIU	n.a.	n.a.
Room_7057 56	Reverse Action	4	No PIU	n.a.	n.a.
Room_7058 53-54	Reverse Action	4	No PIU	n.a.	n.a.
Room_7059 53-54	Reverse Action	4	No PIU	n.a.	n.a.
Room_7060 57	Reverse Action	4	No PIU	n.a.	n.a.
Room_7061 57	Reverse Action	4	No PIU	n.a.	n.a.
Room_7062 58	Reverse Action	4	No PIU	n.a.	n.a.
Room_7063 58	Reverse Action	4	No PIU	n.a.	n.a.
Room_7064 58	Reverse Action	4	No PIU	n.a.	n.a.
Room_7065 57	Reverse Action	4	No PIU	n.a.	n.a.
Room_7066 58	Reverse Action	4	No PIU	n.a.	n.a.
Room_6000 casino slots	Reverse Action	4	No PIU	n.a.	n.a.
Room_6004 casino cs	Reverse Action	4	No PIU	n.a.	n.a.
Room_6001 casino	Reverse Action	4	No PIU	n.a.	n.a.
Room_6002 casino	Reverse Action	4	No PIU	n.a.	n.a.
Room_6003 casino	Reverse Action	4	No PIU	n.a.	n.a.
Room_5021 bar 31	Reverse Action	4	No PIU	n.a.	n.a.
Room_5020 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5019 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5018 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5017 restaurant 48	Reverse Action	4	No PIU	n.a.	n.a.
Room_5016 kitchen 49	Reverse Action	4	No PIU	n.a.	n.a.
Room_5015 coffee 38	Reverse Action	4	No PIU	n.a.	n.a.

Alternative C: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_5007 buffet 10	Reverse Action	4	No PIU	n.a.	n.a.
Room_5006 dining 9	Reverse Action	4	No PIU	n.a.	n.a.
Room_5005 kitchen 11	Reverse Action	4	No PIU	n.a.	n.a.
Room_5004 kitchen 11	Reverse Action	4	No PIU	n.a.	n.a.
Room_5003 kitchen 11 PL2	Reverse Action	4	No PIU	n.a.	n.a.
Room_5002 kitchen 12 PL	Reverse Action	4	No PIU	n.a.	n.a.
Room_5001 rest 9	Reverse Action	4	No PIU	n.a.	n.a.
Room_5000 bar 16	Reverse Action	4	No PIU	n.a.	n.a.
Room_3002 retail 18	Reverse Action	4	No PIU	n.a.	n.a.
Room_3001 retail 18	Reverse Action	4	No PIU	n.a.	n.a.
Room_3000 Retail 18	Reverse Action	4	No PIU	n.a.	n.a.
Room_8000 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8001 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8002 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8003 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8004 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8005 mech 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_1000 corr 45-46	Reverse Action	4	No PIU	n.a.	n.a.
Room_1002 circ 44	Reverse Action	4	No PIU	n.a.	n.a.
Room_1004 circ 44	Reverse Action	4	No PIU	n.a.	n.a.
Room_1005 circ 44	Reverse Action	4	No PIU	n.a.	n.a.
Room_1006 circ 44	Reverse Action	4	No PIU	n.a.	n.a.
Room_1007 warehouse 4	Reverse Action	4	No PIU	n.a.	n.a.
Room_1008 banquet 36	Reverse Action	4	No PIU	n.a.	n.a.
Room_1009 lobby 15	Reverse Action	4	No PIU	n.a.	n.a.
Room_1010 corr 37	Reverse Action	4	No PIU	n.a.	n.a.
Room_1011 corr 37	Reverse Action	4	No PIU	n.a.	n.a.
Room_1012 circ 19	Reverse Action	4	No PIU	n.a.	n.a.
Room_1013 circ 39	Reverse Action	4	No PIU	n.a.	n.a.
Room_1015 BOH 3	Reverse Action	4	No PIU	n.a.	n.a.
Room_1016 warehouse	Reverse Action	4	No PIU	n.a.	n.a.
Room_1017 BOH 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_1018 BOH 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_0121 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0122 htl	Reverse Action	4	No PIU	n.a.	n.a.

Alternative C: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_5014 lounge 31	Reverse Action	4	No PIU	n.a.	n.a.
Room_5013 lounge 31	Reverse Action	4	No PIU	n.a.	n.a.
Room_5012 kitchen 34	Reverse Action	4	No PIU	n.a.	n.a.
Room_5011 dining 35	Reverse Action	4	No PIU	n.a.	n.a.
Room_5010 dining 33	Reverse Action	4	No PIU	n.a.	n.a.
Room_5009 dining 33	Reverse Action	4	No PIU	n.a.	n.a.
Room_5008 food court 13	Reverse Action	4	No PIU	n.a.	n.a.
Room_5007 buffet 10	Reverse Action	4	No PIU	n.a.	n.a.
Room_5006 dining 9	Reverse Action	4	No PIU	n.a.	n.a.
Room_5005 kitchen 11	Reverse Action	4	No PIU	n.a.	n.a.
Room_5004 kitchen 11	Reverse Action	4	No PIU	n.a.	n.a.
Room_5003 kitchen 11 PL2	Reverse Action	4	No PIU	n.a.	n.a.
Room_5002 kitchen 12 PL	Reverse Action	4	No PIU	n.a.	n.a.
Room_5001 rest 9	Reverse Action	4	No PIU	n.a.	n.a.
Room_5000 bar 16	Reverse Action	4	No PIU	n.a.	n.a.
Room_3002 retail 18	Reverse Action	4	No PIU	n.a.	n.a.
Room_3001 retail 18	Reverse Action	4	No PIU	n.a.	n.a.
Room_3000 Retail 18	Reverse Action	4	No PIU	n.a.	n.a.
Room_8000 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8001 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8002 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8003 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8004 mech	Reverse Action	4	No PIU	n.a.	n.a.
Room_8005 mech 14	Reverse Action	4	No PIU	n.a.	n.a.
Room_1000 corr 45-46	Reverse Action	4	No PIU	n.a.	n.a.
Room_1002 circ 44	Reverse Action	4	No PIU	n.a.	n.a.
Room_1004 circ 44	Reverse Action	4	No PIU	n.a.	n.a.
Room_1005 circ 44	Reverse Action	4	No PIU	n.a.	n.a.
Room_1006 circ 44	Reverse Action	4	No PIU	n.a.	n.a.
Room_1007 warehouse 4	Reverse Action	4	No PIU	n.a.	n.a.
Room_1008 banquet 36	Reverse Action	4	No PIU	n.a.	n.a.
Room_1009 lobby 15	Reverse Action	4	No PIU	n.a.	n.a.
Room_1010 corr 37	Reverse Action	4	No PIU	n.a.	n.a.
Room_1011 corr 37	Reverse Action	4	No PIU	n.a.	n.a.

Alternative C: Base Case

Room_0123 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0124 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0126 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0127 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0128 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0129 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0130 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_1014 meeting 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_1003 meeting 41-43	Reverse Action	4	No PIU	n.a.	n.a.
Kitchen MAU	Reverse Action	4	No PIU	n.a.	n.a.

Zone Heating

	Zone Reheat		Baseboards	
Name	Reheat Delta-T (°F)	Heat Source	Rating (kBtu/hr)	Control
Room_6005 toilet 17	50	Hot Water from Plant	n.a.	n.a.
Room_7000 office 17	50	Hot Water from Plant	n.a.	n.a.
Room_7001 office 8	50	Hot Water from Plant	n.a.	n.a.
Room_7002 office 8	50	Hot Water from Plant	n.a.	n.a.
Room_7003 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7004 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7005 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7006 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7007 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7008 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7009 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7011 corr 14	50	Hot Water from Plant	n.a.	n.a.
Room_7013 office 18	50	Hot Water from Plant	n.a.	n.a.
Room_7012 locker 7	50	Hot Water from Plant	n.a.	n.a.
Room_7014 office 1	50	Hot Water from Plant	n.a.	n.a.
Room_7015 office 2	50	Hot Water from Plant	n.a.	n.a.
Room_7016 storage	50	Hot Water from Plant	n.a.	n.a.
Room_7017 office 2	50	Hot Water from Plant	n.a.	n.a.
Room_7018 Office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7019 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7020 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7021 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7022 office 14	50	Hot Water from Plant	n.a.	n.a.
Room_7023 office 51	50	Hot Water from Plant	n.a.	n.a.
Room_7050 47	50	Hot Water from Plant	n.a.	n.a.
Room_7051 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7052 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7053 55	50	Hot Water from Plant	n.a.	n.a.
Room_7054 56	50	Hot Water from Plant	n.a.	n.a.
Room_7055 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7056 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7057 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7058 56	50	Hot Water from Plant	n.a.	n.a.
Room_7059 56	50	Hot Water from Plant	n.a.	n.a.
Room_7060 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7061 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7062 57	50	Hot Water from Plant	n.a.	n.a.
Room_7063 57	50	Hot Water from Plant	n.a.	n.a.
Room_7064 58	50	Hot Water from Plant	n.a.	n.a.
Room_7065 58	50	Hot Water from Plant	n.a.	n.a.
Room_7066 58	50	Hot Water from Plant	n.a.	n.a.
Room_7067 57	50	Hot Water from Plant	n.a.	n.a.
Room_7068 58	50	Hot Water from Plant	n.a.	n.a.
Room_8015 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8014 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8013 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8012 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8011 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8010 BOH 40	50	Hot Water from Plant	n.a.	n.a.
Room_8009 BOH 32	50	Hot Water from Plant	n.a.	n.a.
Room_8008 BOH 32	50	Hot Water from Plant	n.a.	n.a.
Room_8007 BOH 32	50	Hot Water from Plant	n.a.	n.a.

Alternative C: Mitigated Case

Room_1012 circ 19	Reverse Action	4	No PIU	n.a.	n.a.
Room_1013 circ 39	Reverse Action	4	No PIU	n.a.	n.a.
Room_1015 BOH 3	Reverse Action	4	No PIU	n.a.	n.a.
Room_1016 warehouse	Reverse Action	4	No PIU	n.a.	n.a.
Room_1017 BOH 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_1018 BOH 40	Reverse Action	4	No PIU	n.a.	n.a.
Room_0121 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0122 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0123 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0124 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0126 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0127 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0128 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0129 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_0130 htl	Reverse Action	4	No PIU	n.a.	n.a.
Room_1003 meeting 41-43	Reverse Action	4	No PIU	n.a.	n.a.
Room_1014 meeting 40	Reverse Action	4	No PIU	n.a.	n.a.
Kitchen MAU	Reverse Action	4	No PIU	n.a.	n.a.

Zone Heating

	Zone Reheat		Baseboards	
Name	Reheat Delta-T (°F)	Heat Source	Rating (kBtu/hr)	Control
Room_6005 toilet 17	50	Hot Water from Plant	n.a.	n.a.
Room_7000 office 17	50	Hot Water from Plant	n.a.	n.a.
Room_7001 office 8	50	Hot Water from Plant	n.a.	n.a.
Room_7002 office 8	50	Hot Water from Plant	n.a.	n.a.
Room_7003 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7004 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7005 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7006 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7007 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7008 office 6	50	Hot Water from Plant	n.a.	n.a.
Room_7009 office 5	50	Hot Water from Plant	n.a.	n.a.
Room_7011 corr 14	50	Hot Water from Plant	n.a.	n.a.
Room_7013 office 18	50	Hot Water from Plant	n.a.	n.a.
Room_7012 locker 7	50	Hot Water from Plant	n.a.	n.a.
Room_7014 office 1	50	Hot Water from Plant	n.a.	n.a.
Room_7015 office 2	50	Hot Water from Plant	n.a.	n.a.
Room_7016 storage	50	Hot Water from Plant	n.a.	n.a.
Room_7017 office 2	50	Hot Water from Plant	n.a.	n.a.
Room_7018 Office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7019 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7020 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7021 office 52	50	Hot Water from Plant	n.a.	n.a.
Room_7022 office 14	50	Hot Water from Plant	n.a.	n.a.
Room_7023 office 51	50	Hot Water from Plant	n.a.	n.a.
Room_8006 BOH 36 PL	50	Hot Water from Plant	n.a.	n.a.
Room_8007 BOH 32	50	Hot Water from Plant	n.a.	n.a.
Room_8008 BOH 32	50	Hot Water from Plant	n.a.	n.a.
Room_8009 BOH 32	50	Hot Water from Plant	n.a.	n.a.
Room_8010 BOH 40	50	Hot Water from Plant	n.a.	n.a.
Room_8011 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8012 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8013 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8014 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_8015 BOH 50	50	Hot Water from Plant	n.a.	n.a.
Room_7067 47	50	Hot Water from Plant	n.a.	n.a.
Room_7068 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7050 53-54	50	Hot Water from Plant	n.a.	n.a.

Alternative C: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_8006 BOH 36	50	Hot Water from Plant	n.a.	n.a.
Room_6000 casino slots	50	Hot Water from Plant	n.a.	n.a.
Room_6004 casino cs	50	Hot Water from Plant	n.a.	n.a.
Room_6001 casino	50	Hot Water from Plant	n.a.	n.a.
Room_6002 casino	50	Hot Water from Plant	n.a.	n.a.
Room_6003 casino	50	Hot Water from Plant	n.a.	n.a.
Room_5021 bar 31	50	Hot Water from Plant	n.a.	n.a.
Room_5020 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5019 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5018 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5017 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5016 kitchen 49	50	Hot Water from Plant	n.a.	n.a.
Room_5015 coffee 38	50	Hot Water from Plant	n.a.	n.a.
Room_5014 lounge 31	50	Hot Water from Plant	n.a.	n.a.
Room_5013 lounge 31	50	Hot Water from Plant	n.a.	n.a.
Room_5012 kitchen 34	50	Hot Water from Plant	n.a.	n.a.
Room_5011 dining 35	50	Hot Water from Plant	n.a.	n.a.
Room_5010 dining 33	50	Hot Water from Plant	n.a.	n.a.
Room_5009 dining 33	50	Hot Water from Plant	n.a.	n.a.
Room_5008 food court 13	50	Hot Water from Plant	n.a.	n.a.
Room_5007 buffet 10	50	Hot Water from Plant	n.a.	n.a.
Room_5006 dining 9	50	Hot Water from Plant	n.a.	n.a.
Room_5005 kitchen 11	50	Hot Water from Plant	n.a.	n.a.
Room_5004 kitchen 11	50	Hot Water from Plant	n.a.	n.a.
Room_5003 kitchen 11 PL2	50	Hot Water from Plant	n.a.	n.a.
Room_5002 kitchen 12 PL	50	Hot Water from Plant	n.a.	n.a.
Room_5001 rest 9	50	Hot Water from Plant	n.a.	n.a.
Room_5000 bar 16	50	Hot Water from Plant	n.a.	n.a.
Room_3002 retail 18	50	Hot Water from Plant	n.a.	n.a.
Room_3001 retail 18	50	Hot Water from Plant	n.a.	n.a.
Room_3000 Retail 18	50	Hot Water from Plant	n.a.	n.a.
Room_8000 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8001 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8002 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8003 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8004 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8005 mech 14	50	Hot Water from Plant	n.a.	n.a.
Room_1000 corr 45-46	50	Hot Water from Plant	n.a.	n.a.
Room_1002 circ 44	50	Hot Water from Plant	n.a.	n.a.
Room_1004 circ 44	50	Hot Water from Plant	n.a.	n.a.
Room_1005 circ 44	50	Hot Water from Plant	n.a.	n.a.
Room_1006 circ 44	50	Hot Water from Plant	n.a.	n.a.
Room_1007 warehouse 4	50	Hot Water from Plant	n.a.	n.a.
Room_1008 banquet 36	50	Hot Water from Plant	n.a.	n.a.
Room_1009 lobby 15	50	Hot Water from Plant	n.a.	n.a.
Room_1010 corr 37	50	Hot Water from Plant	n.a.	n.a.
Room_1011 corr 37	50	Hot Water from Plant	n.a.	n.a.
Room_1012 circ 19	50	Hot Water from Plant	n.a.	n.a.
Room_1013 circ 39	50	Hot Water from Plant	n.a.	n.a.
Room_1015 BOH 3	50	Hot Water from Plant	n.a.	n.a.
Room_1016 warehouse	50	Hot Water from Plant	n.a.	n.a.
Room_1017 BOH 40	50	Hot Water from Plant	n.a.	n.a.

Alternative C: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_7051 55	50	Hot Water from Plant	n.a.	n.a.
Room_7052 56	50	Hot Water from Plant	n.a.	n.a.
Room_7053 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7054 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7055 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7056 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7057 56	50	Hot Water from Plant	n.a.	n.a.
Room_7058 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7059 53-54	50	Hot Water from Plant	n.a.	n.a.
Room_7060 57	50	Hot Water from Plant	n.a.	n.a.
Room_7061 57	50	Hot Water from Plant	n.a.	n.a.
Room_7062 58	50	Hot Water from Plant	n.a.	n.a.
Room_7063 58	50	Hot Water from Plant	n.a.	n.a.
Room_7064 58	50	Hot Water from Plant	n.a.	n.a.
Room_7065 57	50	Hot Water from Plant	n.a.	n.a.
Room_7066 58	50	Hot Water from Plant	n.a.	n.a.
Room_6000 casino slots	50	Hot Water from Plant	n.a.	n.a.
Room_6004 casino cs	50	Hot Water from Plant	n.a.	n.a.
Room_6001 casino	50	Hot Water from Plant	n.a.	n.a.
Room_6002 casino	50	Hot Water from Plant	n.a.	n.a.
Room_6003 casino	50	Hot Water from Plant	n.a.	n.a.
Room_5021 bar 31	50	Hot Water from Plant	n.a.	n.a.
Room_5020 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5019 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5018 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5017 restaurant 48	50	Hot Water from Plant	n.a.	n.a.
Room_5016 kitchen 49	50	Hot Water from Plant	n.a.	n.a.
Room_5015 coffee 38	50	Hot Water from Plant	n.a.	n.a.
Room_5014 lounge 31	50	Hot Water from Plant	n.a.	n.a.
Room_5013 lounge 31	50	Hot Water from Plant	n.a.	n.a.
Room_5012 kitchen 34	50	Hot Water from Plant	n.a.	n.a.
Room_5011 dining 35	50	Hot Water from Plant	n.a.	n.a.
Room_5010 dining 33	50	Hot Water from Plant	n.a.	n.a.
Room_5009 dining 33	50	Hot Water from Plant	n.a.	n.a.
Room_5008 food court 13	50	Hot Water from Plant	n.a.	n.a.
Room_5007 buffet 10	50	Hot Water from Plant	n.a.	n.a.
Room_5006 dining 9	50	Hot Water from Plant	n.a.	n.a.
Room_5005 kitchen 11	50	Hot Water from Plant	n.a.	n.a.
Room_5004 kitchen 11	50	Hot Water from Plant	n.a.	n.a.
Room_5003 kitchen 11 PL2	50	Hot Water from Plant	n.a.	n.a.
Room_5002 kitchen 12 PL	50	Hot Water from Plant	n.a.	n.a.
Room_5001 rest 9	50	Hot Water from Plant	n.a.	n.a.
Room_5000 bar 16	50	Hot Water from Plant	n.a.	n.a.
Room_3002 retail 18	50	Hot Water from Plant	n.a.	n.a.
Room_3001 retail 18	50	Hot Water from Plant	n.a.	n.a.
Room_3000 Retail 18	50	Hot Water from Plant	n.a.	n.a.
Room_8000 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8001 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8002 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8003 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8004 mech	50	Hot Water from Plant	n.a.	n.a.
Room_8005 mech 14	50	Hot Water from Plant	n.a.	n.a.
Room_1000 corr 45-46	50	Hot Water from Plant	n.a.	n.a.
Room_1002 circ 44	50	Hot Water from Plant	n.a.	n.a.
Room_1004 circ 44	50	Hot Water from Plant	n.a.	n.a.

Alternative C: Base Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_1018 BOH 40	50	Hot Water from Plant	n.a.	n.a.
Room_1014 meeting 40	50	Hot Water from Plant	n.a.	n.a.
Room_1003 meeting 41-43	50	Hot Water from Plant	n.a.	n.a.
Kitchen MAU	50	Hot Water from Plant	n.a.	n.a.

Alternative C: Mitigated Case

VisualDOE 4.1 - Zones Summary **April 3, 2014**

Room_1005 circ 44	50	Hot Water from Plant	n.a.	n.a.
Room_1006 circ 44	50	Hot Water from Plant	n.a.	n.a.
Room_1007 warehouse 4	50	Hot Water from Plant	n.a.	n.a.
Room_1008 banquet 36	50	Hot Water from Plant	n.a.	n.a.
Room_1009 lobby 15	50	Hot Water from Plant	n.a.	n.a.
Room_1010 corr 37	50	Hot Water from Plant	n.a.	n.a.
Room_1011 corr 37	50	Hot Water from Plant	n.a.	n.a.
Room_1012 circ 19	50	Hot Water from Plant	n.a.	n.a.
Room_1013 circ 39	50	Hot Water from Plant	n.a.	n.a.
Room_1015 BOH 3	50	Hot Water from Plant	n.a.	n.a.
Room_1016 warehouse	50	Hot Water from Plant	n.a.	n.a.
Room_1017 BOH 40	50	Hot Water from Plant	n.a.	n.a.
Room_1018 BOH 40	50	Hot Water from Plant	n.a.	n.a.
Room_1003 meeting 41-43	50	Hot Water from Plant	n.a.	n.a.
Room_1014 meeting 40	50	Hot Water from Plant	n.a.	n.a.
Kitchen MAU	50	Hot Water from Plant	n.a.	n.a.

Alternative C: Base Case

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt C Base Case
Case Description: Ph1a b 2 3

Chilled Water Temperature 44 °F

Chilled Water Pumps

Type	Variable-Speed
Head (ft)	75
Motor Efficiency	0.65
Impeller Efficiency	1

Hot Water Pump

Type	Variable-Speed
Head (ft)	60
Motor Efficiency	1
Impeller Efficiency	0.6

Cooling Tower (Central Plant)

Type	Open
Efficiency (bhp/tons)	0.017
Approach Temperature	8 °F
Design Wetbulb Temperature	78 °F
Design Range	10 °F
Cooling Cap (tons) AutoSized	4229.65
Waterside Economizer	No
Number of Cells	1
Cell Control	Minimum Needed
Temperature Control	Fixed
Setpoint Temperature	85 °F
Throttling Temperature	10 °F
Minimum Water Temperature	55 °F
Capacity Control	Two-Speed Fan
Minimum CFM Ratio	0.5
Minimum Power Ratio	0.16

Chiller Type #1: Centrifugal

Condenser Type	Water-cooled
Chiller Autosized	Yes
Hot Gas ByPass	No
Min. Operating Point	0.2144
Rated Efficiency	0.576 (kW/ton)
Rated CHWS	44 °F
Rated Condition CWS	85 °F
Evap. Flow	2.4 (gpm/ton)
Evap. Pressure Drop	0 (ft)
Evap. Imp. Eff.	1
Evap. Motor Eff.	1
Cond. Flow	2.78 (gpm/ton)
Cond. Pressure Drop	60 (ft)
Cond. Imp. Eff.	1
Cond. Motor Eff.	0.6
Number Installed	1
AutoSized	3441.823 (tons)

Alternative C: Mitigated Case

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt C Design Case
Case Description: Ph1a b 2 3

Chilled Water Temperature 42 °F

Chilled Water Pumps

Type	Variable-Speed
Head (ft)	75
Motor Efficiency	1
Impeller Efficiency	0.65

Hot Water Pump

Type	Variable-Speed
Head (ft)	60
Motor Efficiency	1
Impeller Efficiency	0.65

Cooling Tower (Central Plant)

Type	Open
Efficiency (bhp/tons)	0.013
Approach Temperature	8 °F
Design Wetbulb Temperature	78 °F
Design Range	15 °F
Cooling Cap (tons) AutoSized	4612.898
Waterside Economizer	No
Number of Cells	5
Cell Control	Minimum Needed
Temperature Control	Fixed
Setpoint Temperature	85 °F
Throttling Temperature	15 °F
Minimum Water Temperature	55 °F
Capacity Control	Variable Speed Fan
Minimum Fan Speed	0.5

Chiller Type #1: Centrifugal

Condenser Type	Water-cooled
Chiller Autosized	No
Hot Gas ByPass	No
Min. Operating Point	0.2144
Rated Efficiency	0.52 (kW/ton)
Rated CHWS	44 °F
Rated Condition CWS	85 °F
Evap. Flow	1.7 (gpm/ton)
Evap. Pressure Drop	0 (ft)
Evap. Imp. Eff.	1
Evap. Motor Eff.	1
Cond. Flow	2.75 (gpm/ton)
Cond. Pressure Drop	60 (ft)
Cond. Imp. Eff.	1
Cond. Motor Eff.	0.6
Number Installed	5
Size #1	800.0 (tons)
Size #2	800.0 (tons)
Size #3	800.0 (tons)
Size #4	800.0 (tons)
Size #5	800.0 (tons)

Alternative C: Base Case

Fuel Boiler Type #1: Fuel Hot Water w/ Atmospheric Burner

Boiler Autosized	Yes
Number Installed	1
Boiler Efficiency	0.8
Min. Operating Point	0.5
Max. Operating Point	1
AutoSized	27.507 MBtu/h

Alternative C: Mitigated Case

Fuel Boiler Type #1: Fuel Hot Water w/ Atmospheric Burner

Boiler Autosized	Yes
Number Installed	1
Boiler Efficiency	0.85
Min. Operating Point	0.5
Max. Operating Point	1
AutoSized	27.028 MBtu/h

Alternative C: Base Case

VisualDOE 4.1 - Systems Summary **April 3, 2014**

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt C Base Case
Case Description: Ph1a b 2 3
Number of Systems: 19

Systems Summary

Name	Type	Conditioned Area (ft²)	Supply Air (CFM)	Min. OA Ratio	Cooling Cap (kBtu/h)	Heating Cap (kBtu/h)	Cooling Peak (kBtu/h)	Heating Peak (kBtu/h)	Cooling Energy (MBtu)	Heating Energy (MBtu)
System_38073	PSZ	88200	68163	0.071	2258.8	3650.1	774.3	320.2	1680	184.8
AHU Office	VAVS	268675	263094	0.087	13451.6	0	5491	2029.4	11307.8	961.6
AHU Slots	VAVS	73898	245578	0.2	13777	0	10678	466.6	28593.1	2174.7
AHU Tables	VAVS	65980	235852	0.2	13193.7	0	9371.1	202.3	23671.6	139.8
AHU Restaurant	VAVS	92710	144897	0.472	8396.9	3251.7	7000.8	5010	8281.8	2410.9
AHU Retail	VAVS	8572	8259	0.052	383.3	0	506	521.5	283.7	684.2
FCU Mech	VAVS	32266	27672	0.064	1384.8	0	695.9	444.2	3413.8	865.6
AHU Assembly	VAVS	133591	144692	0.523	8391.3	4057.3	5416.1	9099.2	4658.7	4322.2
System_38082	PSZ	9000	12924	0.038	395.6	647	199.7	217	214	403.4
System_38083	PSZ	40578	66385	0.034	1996.3	3290.3	1039.7	809.2	1477.2	1107.8
System_38084	PSZ	40476	61964	0.036	1881.4	3086.3	1000	849.4	1097.8	1451.8
System_38085	PSZ	9010	7218	0.069	237.9	384.6	102.3	120	154	224.2
System_38086	PSZ	88202	68396	0.071	2265.3	3660.8	736.2	323.7	1569.2	221
System_38087	PSZ	40578	67558	0.033	2028.8	3344.3	1067.5	817.1	1460.3	1143.5
System_38088	PSZ	40476	61414	0.036	1866.2	3061.1	985.9	848.4	1086.9	1457.2
System_38089	PSZ	9010	15490	0.032	463.1	765.1	232.1	193.4	344.3	260.8
System_38090	PSZ	9000	7225	0.069	238	384.9	99.4	131.7	130.7	277.8
AHU Meeting	VAVS	24415	51882	1	2997.6	4114.8	2132.7	3329	1627.9	1080.7
AHU MAU Ph1	RHFS	1	50000	1	2668.4	0	3714.6	3143	4286.2	8708.9

Systems Summary per Conditioned Area

Name	Type	Conditioned Area (ft²)	Supply Air (CFM/ft²)	Min. OA Ratio	Cooling Cap (Btu/h/ft²)	Heating Cap (Btu/h/ft²)	Cooling Peak (Btu/h/ft²)	Heating Peak (Btu/h/ft²)	Cooling Energy (kBtu/ft²)	Heating Energy (kBtu/ft²)
System_38073	PSZ	88200	0.773	0.071	26	41	9	4	19	2.1
AHU Office	VAVS	268675	0.979	0.087	50	0	20	8	42.1	3.6
AHU Slots	VAVS	73898	3.323	0.2	186	0	144	6	386.9	29.4
AHU Tables	VAVS	65980	3.575	0.2	200	0	142	3	358.8	2.1
AHU Restaurant	VAVS	92710	1.563	0.472	91	35	76	54	89.3	26
AHU Retail	VAVS	8572	0.964	0.052	45	0	59	61	33.1	79.8
FCU Mech	VAVS	32266	0.858	0.064	43	0	22	14	105.8	26.8
AHU Assembly	VAVS	133591	1.083	0.523	63	30	41	68	34.9	32.4
System_38082	PSZ	9000	1.436	0.038	44	72	22	24	23.8	44.8
System_38083	PSZ	40578	1.636	0.034	49	81	26	20	36.4	27.3
System_38084	PSZ	40476	1.531	0.036	46	76	25	21	27.1	35.9
System_38085	PSZ	9010	0.801	0.069	26	43	11	13	17.1	24.9
System_38086	PSZ	88202	0.775	0.071	26	42	8	4	17.8	2.5
System_38087	PSZ	40578	1.665	0.033	50	82	26	20	36	28.2
System_38088	PSZ	40476	1.517	0.036	46	76	24	21	26.9	36
System_38089	PSZ	9010	1.719	0.032	51	85	26	21	38.2	28.9
System_38090	PSZ	9000	0.803	0.069	26	43	11	15	14.5	30.9
AHU Meeting	VAVS	24415	2.125	1	123	169	87	136	66.7	44.3
AHU MAU Ph1	RHFS	1	50000	1	2668372	0	3714582	3143035	4286243	8708873

Alternative C: Mitigated Case

VisualDOE 4.1 - Systems Summary **April 3, 2014**

Project Information
Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Case Name: Alt C Design Case
Case Description: Ph1a b 2 3
Number of Systems: 19

Systems Summary

Name	Type	Conditioned Area (ft²)	Supply Air (CFM)	Min. OA Ratio	Cooling Cap (kBtu/h)	Heating Cap (kBtu/h)	Cooling Peak (kBtu/h)	Heating Peak (kBtu/h)	Cooling Energy (MBtu)	Heating Energy (MBtu)
System_38073	FPFC	88200	64335	0.075	0	0	822	399.2	1082.3	200.3
AHU Office	VAVS	268675	251891	0.091	12944.9	0	5510.3	3785.3	9183.1	2785.7
AHU Slots	VAVS	73898	241637	0.2	13564.6	0	7603.6	448.5	26659.8	1036.4
AHU Tables	VAVS	65980	233177	0.2	13049.8	0	6750.4	918	22209.1	5.2
AHU Restaurant	VAVS	92710	140789	0.47	8159.1	3135.7	6065.1	8853.8	6561.4	2023
AHU Retail	VAVS	8572	7762	0.055	362.3	0	298.2	490.1	183.2	219.1
FCU Mech	VAVS	32266	26382	0.067	1327.9	0	582.3	91.6	971.5	3.5
AHU Assembly	VAVS	133591	139506	0.543	8095.7	4211.4	5091.2	8773.1	4344.3	3957
System_38082	FPFC	9000	12215	0.041	0	0	212.8	217	106	188.9
System_38083	FPFC	40578	65641	0.034	0	0	1090	663.9	1010.4	603.2
System_38084	FPFC	40476	59998	0.037	0	0	812.8	833.3	545.7	651.3
System_38085	FPFC	9010	6746	0.073	0	0	100.7	110.8	70.3	80
System_38086	FPFC	88202	64501	0.075	0	0	846	287.6	909	34.3
System_38087	FPFC	40578	65383	0.034	0	0	1099.7	740.3	862.1	415.8
System_38088	FPFC	40476	59792	0.037	0	0	817.3	823.7	590.1	628.3
System_38089	FPFC	9010	15063	0.033	0	0	181.7	184.3	188.9	97.2
System_38090	FPFC	9000	6747	0.073	0	0	101.3	126.1	66.8	104.5
AHU Meeting	VAVS	24415	51882	1	2997.6	4114.8	1366.5	3262.7	1730.3	1026.5
Kitchen MAU	RHFS	1	50000	1	2668.4	0	3714.6	3157.2	4369.7	8886.9

Systems Summary per Conditioned Area

Name	Type	Conditioned Area (ft²)	Supply Air (CFM/ft²)	Min. OA Ratio	Cooling Cap (Btu/h/ft²)	Heating Cap (Btu/h/ft²)	Cooling Peak (Btu/h/ft²)	Heating Peak (Btu/h/ft²)	Cooling Energy (kBtu/ft²)	Heating Energy (kBtu/ft²)
System_38073	FPFC	88200	0.729	0.075	0	0	9	5	12.3	2.3
AHU Office	VAVS	268675	0.938	0.091	48	0	21	14	34.2	10.4
AHU Slots	VAVS	73898	3.27	0.2	184	0	103	6	360.8	14
AHU Tables	VAVS	65980	3.534	0.2	198	0	102	14	336.6	0.1
AHU Restaurant	VAVS	92710	1.519	0.47	88	34	65	95	70.8	21.8
AHU Retail	VAVS	8572	0.906	0.055	42	0	35	57	21.4	25.6
FCU Mech	VAVS	32266	0.818	0.067	41	0	18	3	30.1	0.1
AHU Assembly	VAVS	133591	1.044	0.543	61	32	38	66	32.5	29.6
System_38082	FPFC	9000	1.357	0.041	0	0	24	24	11.8	21
System_38083	FPFC	40578	1.618	0.034	0	0	27	16	24.9	14.9
System_38084	FPFC	40476	1.482	0.037	0	0	20	21	13.5	16.1
System_38085	FPFC	9010	0.749	0.073	0	0	11	12	7.8	8.9
System_38086	FPFC	88202	0.731	0.075	0	0	10	3	10.3	0.4
System_38087	FPFC	40578	1.611	0.034	0	0	27	18	21.2	10.2
System_38088	FPFC	40476	1.477	0.037	0	0	20	20	14.6	15.5
System_38089	FPFC	9010	1.672	0.033	0	0	20	20	21	10.8
System_38090	FPFC	9000	0.75	0.073	0	0	11	14	7.4	11.6
AHU Meeting	VAVS	24415	2.125	1	123	169	56	134	70.9	42
Kitchen MAU	RHFS	1	50000	1	2668372	0	3714611	3157236	4369668	8886871

Alternative C: Base Case

Individual System
Name: System_38073
Type: Packaged Single Zone
Occupancy: Hotel
Control Zone: Room_0120 htl
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 88200.0
Average Air Flow per Conditioned Area (cfm/ft²): 0.77

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3650.1	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		68163

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	2258.82
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: System_38073
Type: Four Pipe Fan Coil
Occupancy: HtlRoomCtrl
Control Zone: Room_0120 htl
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 88200.0
Average Air Flow per Conditioned Area (cfm/ft²): 0.73

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		64335

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: AHU Office
Type: Variable Air Volume
Occupancy: Office
Control Zone: Room_7001 office 8
Number of Conditioned Zones Served: 53
Total Conditioned Area Served (ft²): 268675.3
Average Air Flow per Conditioned Area (cfm/ft²): 0.98

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	263094

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	13451.64
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: AHU Office
Type: Variable Air Volume
Occupancy: Office
Control Zone: Room_7001 office 8
Number of Conditioned Zones Served: 53
Total Conditioned Area Served (ft²): 268675.3
Average Air Flow per Conditioned Area (cfm/ft²): 0.94

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	251891

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	12944.88
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: AHU Slots
Type: Variable Air Volume
Occupancy: Casino Gaming
Control Zone: Room_6000 casino slots
Number of Conditioned Zones Served: 3
Total Conditioned Area Served (ft²): 73897.8
Average Air Flow per Conditioned Area (cfm/ft²): 3.32

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	245578

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	13777.0
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: AHU Slots
Type: Variable Air Volume
Occupancy: Casino Gaming
Control Zone: Room_6000 casino slots
Number of Conditioned Zones Served: 3
Total Conditioned Area Served (ft²): 73897.8
Average Air Flow per Conditioned Area (cfm/ft²): 3.27

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Heat Recovery

Heat Recovery Effectiveness	80%

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	241637

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	13564.55
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: AHU Tables
Type: Variable Air Volume
Occupancy: Casino Gaming
Control Zone: Room_6003 casino
Number of Conditioned Zones Served: 2
Total Conditioned Area Served (ft²): 65980.3
Average Air Flow per Conditioned Area (cfm/ft²): 3.57

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	235852

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	13193.69
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: AHU Tables
Type: Variable Air Volume
Occupancy: Casino Gaming
Control Zone: Room_6002 casino
Number of Conditioned Zones Served: 2
Total Conditioned Area Served (ft²): 65980.3
Average Air Flow per Conditioned Area (cfm/ft²): 3.53

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Heat Recovery

Heat Recovery Effectiveness	80%

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	233177

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	13049.83
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: AHU Restaurant
Type: Variable Air Volume
Occupancy: Restaurant
Control Zone: Room_5000 bar 16
Number of Conditioned Zones Served: 22
Total Conditioned Area Served (ft²): 92710.1
Average Air Flow per Conditioned Area (cfm/ft²): 1.56

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Autosized Capacity	3251.75
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Constant Volume
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	144897

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	8396.88
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: AHU Restaurant
Type: Variable Air Volume
Occupancy: Restaurant VAV
Control Zone: Room_5000 bar 16
Number of Conditioned Zones Served: 22
Total Conditioned Area Served (ft²): 92710.1
Average Air Flow per Conditioned Area (cfm/ft²): 1.52

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Autosized Capacity	3135.65
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	140789

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	8159.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: AHU Retail
Type: Variable Air Volume
Occupancy: Retail
Control Zone: Room_3000 Retail 18
Number of Conditioned Zones Served: 3
Total Conditioned Area Served (ft²): 8571.6
Average Air Flow per Conditioned Area (cfm/ft²): 0.96

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Constant Volume
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	8259

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	383.34
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: AHU Retail
Type: Variable Air Volume
Occupancy: Retail
Control Zone: Room_3000 Retail 18
Number of Conditioned Zones Served: 3
Total Conditioned Area Served (ft²): 8571.6
Average Air Flow per Conditioned Area (cfm/ft²): 0.91

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	7762

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	362.3
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: FCU Mech
Type: Variable Air Volume
Occupancy: Office
Control Zone: Room_8000 mech
Number of Conditioned Zones Served: 6
Total Conditioned Area Served (ft²): 32266.4
Average Air Flow per Conditioned Area (cfm/ft²): 0.86

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	27672

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1384.77
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: FCU Mech
Type: Variable Air Volume
Occupancy: Office
Control Zone: Room_8000 mech
Number of Conditioned Zones Served: 6
Total Conditioned Area Served (ft²): 32266.4
Average Air Flow per Conditioned Area (cfm/ft²): 0.82

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	26382

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1327.94
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: AHU Assembly
Type: Variable Air Volume
Occupancy: Assembly
Control Zone: Room_1000 corr 45-46
Number of Conditioned Zones Served: 16
Total Conditioned Area Served (ft²): 133591.3
Average Air Flow per Conditioned Area (cfm/ft²): 1.08

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Autosized Capacity	4057.34
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	144692

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	8391.33
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: AHU Assembly
Type: Variable Air Volume
Occupancy: Assembly
Control Zone: Room_1000 corr 45-46
Number of Conditioned Zones Served: 16
Total Conditioned Area Served (ft²): 133591.3
Average Air Flow per Conditioned Area (cfm/ft²): 1.04

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Autosized Capacity	4211.41
Heat Source	Hot Water from Plant

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	139506

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	8095.7
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: System_38082
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 8999.6
Average Air Flow per Conditioned Area (cfm/ft²): 1.44

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	646.97	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		12924

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	395.56
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: System_38082
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 8999.6
Average Air Flow per Conditioned Area (cfm/ft²): 1.36

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		12215

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: System_38083
Type: Packaged Single Zone
Occupancy: Hotel
Control Zone: Room_0122 htl
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40578.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.64

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3290.34	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		66385

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1996.3
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: System_38083
Type: Four Pipe Fan Coil
Occupancy: HtlRoomCtrl
Control Zone: Room_0122 htl
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40578.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.62

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		65641

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: System_38084
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40476.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.53

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3086.32	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		61964

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1881.43
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: System_38084
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40476.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.48

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		59998

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: System_38085
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 9010.5
Average Air Flow per Conditioned Area (cfm/ft²): 0.80

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	384.61	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		7218

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	237.88
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: System_38085
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 9010.5
Average Air Flow per Conditioned Area (cfm/ft²): 0.75

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		6746

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: System_38086
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 88201.5
Average Air Flow per Conditioned Area (cfm/ft²): 0.78

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3660.81	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		68396

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	2265.32
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: System_38086
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 88201.5
Average Air Flow per Conditioned Area (cfm/ft²): 0.73

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		64501

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: System_38087
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40578.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.61

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		65383

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: System_38087
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40578.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.66

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3344.33	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		67558

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	2028.8
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: System_38088
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40476.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.52

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	3061.05	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		61414

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	1866.2
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: System_38088
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 40476.0
Average Air Flow per Conditioned Area (cfm/ft²): 1.48

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		59792

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: System_38089
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 9010.5
Average Air Flow per Conditioned Area (cfm/ft²): 1.72

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	765.11	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		15490

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	463.13
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: System_38089
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 9010.5
Average Air Flow per Conditioned Area (cfm/ft²): 1.67

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		15063

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

VisualDOE 4.1 - Systems Summary **April 3, 2014**

Individual System
Name: System_38090
Type: Packaged Single Zone
Occupancy: Hotel
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 9000.0
Average Air Flow per Conditioned Area (cfm/ft²): 0.80

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Autosized Capacity	384.87	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		7225

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	238.03
Dehumidification	n.a.
Coil Bypass Factor	0.19
Energy Input Ratio	9
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

VisualDOE 4.1 - Systems Summary **April 3, 2014**

Individual System
Name: System_38090
Type: Four Pipe Fan Coil
Occupancy: Office
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 9000.0
Average Air Flow per Conditioned Area (cfm/ft²): 0.75

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Hot Water from Plant	

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.0004021	
Motor Efficiency	1	
Delta-T	0.8 °F	
Air Flow (cfm)		AutoSized
AutoSized Air Flow		6747

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: AHU Meeting
Type: Variable Air Volume
Occupancy: Assembly
Control Zone: Room_1003 meeting 41-43
Number of Conditioned Zones Served: 2
Total Conditioned Area Served (ft²): 24415.0
Average Air Flow per Conditioned Area (cfm/ft²): 2.13

Economizer

Type	Temperature
Compressor Lockout	Yes
Drybulb Temperature Limit	70 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Autosized Capacity	4114.82
Heat Source	Furnace

Furnace

Thermal Efficiency	0.8
Auxillary Power (kW)	0
Pilot Light (Btu/hr)	500

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	51882

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	2997.61
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: AHU Meeting
Type: Variable Air Volume
Occupancy: Assembly
Control Zone: Room_1003 meeting 41-43
Number of Conditioned Zones Served: 2
Total Conditioned Area Served (ft²): 24415.0
Average Air Flow per Conditioned Area (cfm/ft²): 2.13

Economizer

Type	Enthalpy
Compressor Lockout	Yes
Enthalpy Limit (Btu/lb)	27
Drybulb Temperature Limit	72 °F
Lower Temperature Limit	40 °F

Heating

Max Supply Temperature	105 °F
Design Supply Air Temp Leaving Central Heating Coil	55 °F
Control	Constant
Heating Cap (kBtu/hr)	AutoSized
Autosized Ratio	1.25
Autosized Capacity	4114.82
Heat Source	Hot Water from Plant

Heat Recovery

Heat Recovery Effectiveness	80%

Supply Fan

Spec Method	Enter Pressure/Efficiency
On-Hours Control	Variable Speed
Off-Hours Control	Cycle on Any Zone
Static Pressure (in. water)	5
Mechanical Efficiency	0.55
Motor Efficiency	0.9
Drive Efficiency	0.95
Air Flow (cfm)	AutoSized
AutoSized Air Flow	51882

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Reset for Warmest Zone
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	2997.61
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Base Case

Individual System
Name: AHU MAU Ph1
Type: Constant Volume Reheat Fan System
Occupancy: Restaurant
Control Zone: Kitchen MAU
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 1.0
Average Air Flow per Conditioned Area (cfm/ft²): 50000.00

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Furnace	

Furnace

Thermal Efficiency	0.8
Auxillary Power (kW)	0
Pilot Light (Btu/hr)	500

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.000683	
Motor Efficiency	0.95	
Delta-T	0.8 °F	
Air Flow (cfm)		50000

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	2668.37
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Alternative C: Mitigated Case

Individual System
Name: Kitchen MAU
Type: Constant Volume Reheat Fan System
Occupancy: Restaurant
Control Zone: Kitchen MAU
Number of Conditioned Zones Served: 1
Total Conditioned Area Served (ft²): 1.0
Average Air Flow per Conditioned Area (cfm/ft²): 50000.00

Heating

Max Supply Temperature	105 °F	
Design Supply Air Temp Leaving Central Heating Coil		55 °F
Control	Constant	
Heating Cap (kBtu/hr)	AutoSized	
Autosized Ratio	1.25	
Heat Source	Furnace	

Furnace

Thermal Efficiency	0.8
Auxillary Power (kW)	0
Pilot Light (Btu/hr)	500

Supply Fan

Spec Method		Enter Power/Efficiency
On-Hours Control		Constant Volume
Off-Hours Control		Cycle on Any Zone
Power (bhp/cfm)	0.000683	
Motor Efficiency	0.95	
Delta-T	0.8 °F	
Air Flow (cfm)		50000

Cooling

Min Supply Temperature	55 °F
Design Supply Temperature	55 °F
Control	Constant
Total Capacity (kBtu/h)	Autosized
Sensible Capacity (kBtu/h)	Autosized
Autosized Ratio	1.15
Total Capacity	2668.37
Dehumidification	n.a.
Coil Bypass Factor	0.19
Desuperheater	n.a.
Evaporative Condenser	No
Water Cooled Condenser	No

Project Information

Name: Mashpee
Address: Boston MA
Description: Hotel and Casino
Analysis done by: jbf @ exp U.S. Services Inc
Weather File: MA_Boston_Logan_Intl_Arp
Project File: c:\program files\gdt4\shared\mashpee 2012353\mashpee 14-0325.gph
Calculation Engine: DOE-2.1E-119

Electrical Use Summary

Alternative	Lights	Equipment	Cooling	Tower/Heat Reject.	Pumps/Aux.	Fans	Ext. Lights	Ext. Equip.	Total
Electrical End-use Totals (kWh)									
Alt C Base Case	8,015,144	17,923,860	6,448,507	1,057,057	347,008	8,921,411	528,885	156,658	43,398,530
Alt C Design Case	5,627,557	17,923,860	3,857,813	355,711	279,924	4,998,172	459,900	0	33,502,930
Incremental Electrical Savings (kWh)	(compared with previous alternative, negative savings represent increases)								
Alt C Design Case	2,387,587	0	2,590,694	701,346	67,084	3,923,239	68,985	156,658	9,895,596

Fuel Use Summary

Alternative	Source	Heating	Hot Water	Total
Fuel End-Use Totals				
Alt C Base Case - Natural Gas (Therm)	646,078	395,402	450,079	1,491,559
Alt C Design Case - Natural Gas (Therm)	643,390	302,846	421,271	1,367,507
Incremental Fuel Savings	(compared with previous alternative, negative savings represent increases)			
Alt C Design Case - Natural Gas (Therm)	2,688	92,556	28,808	124,052

Energy Cost Summary ($/y)

Alternative	Total Electric	Total Fuel	Total Utility	Incremental First Cost	PV Life Cycle Cost*
Total Energy Cost ($/y)					
Alt C Base Case	$6,318,836	$1,595,951	$7,914,787	$0	$67,383,040
Alt C Design Case	$4,878,060	$1,463,204	$6,341,264	$0	$53,986,760
Incremental Energy Cost Savings ($/y)		(compared with previous alternative, negative savings represent increases)			
Alt C Design Case	$1,440,776	$132,747	$1,573,523	$0	$13,396,280

* 20 year life cycle w/ 10% discount rate.

Monthly Electrical Usage (kWh)

Alternative	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Alt C Base Case	3,448,175	3,097,375	3,428,441	3,243,082	3,638,617	3,851,530	4,414,283	4,342,940	3,826,315	3,472,425	3,245,390	3,390,032
Alt C Design Case	2,657,840	2,373,791	2,628,212	2,489,385	2,815,591	2,997,905	3,440,463	3,372,069	2,965,025	2,677,475	2,486,585	2,598,823

Monthly Electrical Power Demand (kW)

Alternative	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Alt C Base Case	5,942	5,686	5,817	6,697	6,843	7,512	7,561	7,371	6,853	6,294	5,689	5,644
Alt C Design Case	4,985	4,402	4,547	5,297	5,492	6,015	5,990	5,924	5,460	5,115	4,368	4,358

Monthly Fuel Usage

Alternative	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Alt C Base Case - Natural Gas (Therm)	186,505	155,091	149,516	123,343	109,998	98,957	95,935	94,649	92,411	105,553	125,317	154,267
Alt C Design Case - Natural Gas (Therm)	170,530	139,708	134,173	111,489	102,663	93,373	91,241	89,827	87,369	97,046	111,567	138,496

APPENDIX H PUBLIC COMMENT MATERIALS

Appendix H-1	Public Hearing Transcript - Mashpee, MA - December 2, 2013
Appendix H-2	Public Hearing Transcript - Taunton, MA - December 3, 2013
Appendix H-3	Attachment to Letter from Town of Mashpee Office of Selectmen
Appendix H-4	Attachment to Letter from Garvey Shubert Barer on behalf of Wampanoag Tribe of Gay Head (Aquinnah)
Appendix H-5	Attachment to Letter from CDM Smith on behalf of City of Taunton
Appendix H-6	Attachment to Letter from International Brotherhood of Electrical Workers Local Union 223

Appendix H-1
Public Hearing Transcript - Mashpee, MA - December 2, 2013

U.S. DEPARTMENT OF INTERIOR
BUREAU OF INDIAN AFFAIRS

PUBLIC HEARINGS FOR THE MASHPEE WAMPANOAG TRIBE

FEE-TO-TRUST ACQUISITION AND CASINO PROJECT

TAUNTON AND MASHPEE, MASSACHUSETTS

DRAFT ENVIRONMENTAL IMPACT STATEMENT

December 2, 2013, 5:30 p.m.

Mashpee High School
500 Old Barnstable Road
Mashpee, Massachusetts 02649

December 3, 2013, 5:30 p.m.

Taunton High School
50 Williams Street
Taunton, Massachusetts 02780

LINDA M. CORCORAN
COURT REPORTING SERVICES
P.O. BOX 4
KINGSTON, MA 02364
781-585-8172

APPEARANCES:

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Nashville, TN 37214

Chet L. McGhee, Regional Environmental Scientist
Tel: (615)564-6500

Epsilon Associates, Inc.
3 Clock Tower, Suite 250
Maynard, MA 01754
Tel: (978) 897-7100

David Hewett, LEED AP

THE MASHPEE WOMPANOAG TRIBAL COUNCIL
P.O. Box 1048
Mashpee, MA 02649
Tel: (508) 477-0208

Cedric Cromwell, Chairman

P R O C E E D I N G S

MR. McGHEE: Good evening and thank you for being here tonight. My name is Chet McGhee and I'm the Regional Environmental Scientist with the Bureau of Indian Affairs. I will be the facilitator at the public hearing this evening. At the table with me is Mr. David Hewitt from Epsilon, Inc. Epsilon is the BIA's Environmental Impact Statement consultant for this project. Ms. Catie Ferrara, also from Epsilon, is at the sign in table and will be assisting us during the comment period.

Before we get started, I would like to recognize Chairman Cromwell, and all of our elected officials who here tonight. Thank you for being here.

If you haven't signed in, or signed up to speak, please get with Catie in the back. We would appreciate it if you sign in so that we can document your attendance here tonight. We will accept both written and spoken comments tonight, and we encourage you to make your thoughts known and provide comments. All comments will receive equal weight, whether they

are spoken or written. If you decide to mail your comments, make sure they are submitted prior to the deadline, which is January 17, 2014.

The purpose of tonight's hearing is to receive comments on the BIA's Draft Environmental Impact Statement for the purposed transfer of Tribal-owned fee property in Taunton and Mashpee into Federal Trust for the benefit of the Mashpee Wampanoag Tribe. The Tribe plans to develop the property in Taunton as a destination resort complex. The Tribe is proposing no change in land use for the parcels in Mashpee.

It's important for me to point out that I am not the decision maker on the fee-to-trust application. My role, with the assistance of Epsilon, is to make sure the decision makers are fully aware of all environmental issues before they reach a decision. Tonight's hearing is a very important step in that process and we truly appreciate your participation.

We would now like to invite the Mashpee Wampanoag Chairman Cedric Cromwell for his

comments on the project.

MR. CROMWELL: Thank you and good evening. I am Cedric Cromwell, Chairman of the National Wompanoag Tribe. I would like to welcome everyone here tonight and thank you for attending. I would like to thank the Bureau of Indian Affairs for holding this forum tonight on the Draft Environmental Impact Statement on our land into trust application.

I'd also like to take this moment to thank our people of Mashpee for their cooperation and patience throughout this process. Most of all, I'd like to thank our Tribe and Tribal Elders for being here tonight.

Our people have never wavered from our goal of securing political sovereignty for our Tribal nation and the pursuit of economic opportunity and self reliance for our people.

Securing land and having it placed in trust is an important step toward this goal.

Acquiring the land that is the subject of this application is integral to the sovereignty and to the future of the Mashpee Wampanoag Tribe and to the Wampanoag people that we serve

throughout Southeastern, Massachusetts.

For thousands of years, Southeastern Massachusetts has become home to the Wampanoag people. As indigenous people, we have been the guardians of this land, and today we are here to protect and preserve it for future generations.

This has not been an easy task. Our long struggle for political sovereignty is well documented, and there is no need to repeat it this evening.

However, I will say, for the last thirty-five years we have focused our energy on being re-acknowledged as a sovereign Indian nation by the federal government.

This finally occurred in 2007. It is a step that has allowed us to move forward with the application for land into trust that is the subject of tonight's hearing.

This land identified in the application is important to our people for many reasons.

First, this land will be used so we can govern and take care of our land and take care of ourselves, to provide economic opportunities and services for our people. It will be used

for housing, health care, education, job training, cultural preservation and conservation of our natural resources here in Mashpee.

The facilities will be sustainable and well designed. We have been and will continue to be good neighbors.

In addition to our land here in Mashpee, we are seeking land in Taunton as well. This property has well-documented historical ties to our Tribe. It will be used for the development of a destination resort casino. It will be designed as a first class resort that we can all be proud of. It will generate revenue to the Tribe for the operation of our government, and for the delivery of health and human services for our community.

It is important to note that we have a large service area. The Mashpee Wampanoag Tribe is responsible for providing a range of government services to thousands of Native American people who are living throughout Southeastern Massachusetts.

In addition to providing revenue to support the Tribe, The Taunton Casino will also be an

economic engine to Southeastern Massachusetts. It will be a source of employment and important economic benefits to our host community of Taunton, the Southeastern Massachusetts region, and the Commonwealth of Massachusetts as a whole, and the Mashpee Wompanoag Tribe.

We expect during the comment period of this hearing there will be questions. Once the comment period ends, and everyone has been given the chance to weigh in, we look forward to addressing any and all concerns.

Again, to the BIA, thank you for being here tonight, and thank you to everyone who has come out this evening to be a part of this process.

MR. McGHEE: Thank you, Chairman Cromwell. We have asked our consultant Epsilon to provide you with a brief presentation on the project. David.

MR. HEWITT: Good evening everybody. My name is David Hewitt. I'm the Project Manager for Epsilon Associates. We are the contractor that led the consultant team in the preparation of the Draft EIS. It included many experts, Howard/Stein-Hudson for the field of traffic,

****Pace, Thorndike and Crawford for Water and Sewer, AKRF for socioeconomics, the public archeology lab, GEI, for groundwater and hazardous waste.

We're here tonight to take public comment on the Draft EIS. I'd like to take just a moment to run through where the requirement for the Draft EIS comes from and where we are in the NEPA process.

The Tribe has filed an application to have land placed into trust that constitutes federal action under the National Environmental Policy Act that requires preparation of an EIS.

The Draft EIS process, you may recall, we were here in June of last year, we sort of kicked off the EIS process, we held scoping meetings where we came out and we presented a general overview of what the Tribe was proposing, and we accepted your comments to help guide us in what subjects and what areas of concern you have that should be included in the Draft EIS.

We've now done that. The Draft EIS was published for public notice in the Federal

Register back on November 15th, and the comment period, as Chet noticed -- noted runs until January 17th.

Following the completion of the comment period, we will review your comments and use them to prepare the final EIS which will also be noticed in the Federal Register and followed later on by the Record of Decision which would then allow Land Into Trust to proceed.

It's important for everyone to keep in mind that the Tribe's Land Into Trust application includes land both in Mashpee as well as in Taunton. I want to take a moment to just remind everyone that the EIS also considers the impacts of moving approximately a hundred and seventy acres comprising eleven parcels in Mashpee that range in size from quite small, you know, a tenth of an acre, up to about fifty-eight acres. Those lands include uses such as the Tribal offices, the museum, the parsonage, all the Tribe's various activities that occur there.

In Taunton, the Tribe has proposed that the area surrounding the Taunton, the Liberty Union Industrial Park approximately a hundred and

fifty-one acres, located just east of Routes 24 and 140 access from Stevens Street and O'Connell Way, the proposed site comprises seventeen parcels. It includes some existing uses. There's Work Out World, there's also a few small residential properties, and there's office property on the site as well.

I hope folks can see the graphics okay. I know some of you, if you're in the back, and having trouble seeing that, I encourage you to move up, but this slide is just an aerial. I hope people can get their bearings taking a look at this. You see Route 24 coming down from the top of the screen to the south. You see the railroad that cuts across the site, generally southwest to northeast that sort of bifurcates the site into two halves. And you also see the entrance into the interior of the site that's provided from O'Connell Way off of Stevens Street.

It's important to remember when we're going to talk about alternatives under the -- under that or studying the DEIS that it includes moving the lands in Mashpee into Trust as well.

But I want everyone to take note that it doesn't include any proposed new developments in Mashpee. What the Tribe is proposing is to pretty much continue on with the status quo of existing uses. We're not proposing any real changes in land use.

The current development that's going on with the Tribe, the construction of the new government center, as well as some other proposed housing, is considered not to be quote, a connected action with the Land into Trust application. So those projects are allowed to move forward regardless of the outcome of this.

Under NEPA, you're required to take a look at a range of alternatives that covers sort of a spectrum. For this Draft EIS, we've taken a look at four alternatives for the site in Taunton. Three development alternatives and a no action alternative.

Alternative A is the -- quote, the proposed action, the proposed development. The Tribe is considering -- Forgive me for running through all these statistics, but it's probably the best way to get them on the record -- a four hundred

thousand square foot casino with approximately forty-four hundred gaming positions. Gaming positions are just what they sound like. It's the number of people that are allowed to be playing at one time. So a slot machine is one gaming position. A roulette wheel would have more. A poker table may have six or eight or something.

It's just important to keep track of that, and it's gaming positions that a lot of the impacts are calculated, particularly traffic based on the size of the casino.

Associated with the casino would be three hotels, a total of nine hundred rooms, a number of dining opportunities, an events center, a water park that would be constructed north of the railroad, on the northern parcel. It would be approximately twenty-five thousand square feet. Parking would be both within a structured parking garage, bi-level garage with approximately forty-four hundred spaces as well as approximately nineteen hundred and forty surface spaces.

One other thing I would like to point out

is that we looked at a couple of options for access into the site or egress from the site, more specifically. The options do include a proposed ramp that would connect O'Connell Way directly to Route 140 northbound.

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things that are required by NEPA, such as cumulative impacts and the like of that.

The ones that I've highlighted here in blue text are the ones that I'm going to talk about tonight. Those are the subjects that were of most concern during scoping. If you're interested in one of the subjects that I don't speak about tonight, I encourage you to take a look at the EIS online and you can read about it.

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to support mitigation to support bond funds, makes a -- almost a three million dollar initial payment to the police and two and a half million dollars annually afterward. Again, almost three million to Taunton Fire, and an additional one and a half million annually. Taunton Schools would receive three hundred and seventy thousand dollars annually.

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a computer based study of where the casino would be visible from, from points around town. And I don't have those graphics with me. They're a little hard to interpret up on the screen, but I would encourage everyone to go and take a look at the EIS to see where the analysis shows the casino will be visible, what points around town. Due to topography and forest cover, views of the casino are actually fairly limited.

Where the Draft EIS also takes a look at lighting and those types of things, due the way the casino is designed, there is some confidence that because of the set back of the casino from the edges of the property and the way that it has sort of an enclosed courtyard, a lot of the lighting impacts will also be mitigated.

We did a shadow analysis to see whether shadows from the buildings would be cast anywhere. Only in the late afternoons in wintertime would shadows be long enough to leave the site.

Finally, one of the major subjects that we looked at was, of course, traffic, which is everyone's concern. I am not the traffic

expert, but I am going to try to convey the results of the traffic study and what I want -- one of the points I want to get across is that it is an extremely comprehensive study, a very large study area that was developed in consultation with the Mass. DOT. So the Tribe's consultants proposed intersections to study, worked with DOT, and we expanded that to a total of fifty-four intersections, took traffic counts at fifteen freeway segments and nine interchanges.

The analysis looks at existing conditions, future no action conditions, future build conditions, future build conditions with mitigation for both Alternatives A and B. Alternative C was considered to be similar enough to Alternative A that we didn't have to look at that using a variety of traffic simulation techniques that's been (inaudible) under this in particular.

The study found that there's no getting around that a proposed casino would cause a substantial amount of traffic, the peak being on Friday afternoons, or daily on Friday where it

estimates some ten thousand trips in and ten thousand trips out. The total is actually twenty-two thousand nine hundred and twenty-two trips per day. And that's the highest peak of any time during the day.

To mitigate for that increase in traffic, the Tribe has proposed a very substantial traffic mitigation program, much of it was outlined in the Intergovernmental Agreement. It includes improvements at twenty-three different locations around Taunton with an additional thirteen locations that would receive emergency vehicle signal pre-emption.

Most of the mitigation is focused at the two interchanges on Route 140. Particularly Route 24 and 140 and at Stevens Street and Route 140. And the take away message for the traffic study is that with the Tribe's proposed mitigation in place, traffic operations at those two interchanges would be equal to or better than it is today under existing conditions. Even with the increased traffic from the casino, the proposed improvements may improve the level of service at all those locations.

That about sums it up. I was given the daunting task to run through the entire Draft EIS in a short amount of time. Obviously, we can't cover everything here tonight. I hope everyone's maybe had a chance to take a look at the Draft EIS. It's available online at MWTEIS.com. You're -- you know, you're able -- It's a well-organized document. You're able to click on the particular section that you're interested in.

So if your interest is wetlands or wildlife or if your interest is noise or if your interest is traffic, you should be able to zero in on the topic that's of concern to you and not have to read all thousand pages of the draft.

And I hope everyone will take the time to familiarize themselves with the draft a little bit and to please submit your comments to us, and we welcome your spoken comments tonight. Thank you everyone for coming out.

MR. McGHEE: Thanks, Dave.

This where we will have our public comment period. I guess we don’t have anyone to speak, so we’ll just open it up. If anyone is

interested, please state your name.

MR. McCREADY: My name is Dan McCready, reporter for Cape Cod Broadcasting. I just wanted to let you know I will be reporting on the meeting.

MS. KENNEDY: How long does the land have to be in trust before we start -- before we start the project. How long does it have to be before they okay it? Does it have to be a certain number of years, months?

MR. McGHEE: I don’t believe so. I believe once the decision is made, land into trust --

MS. KENNEDY: Done.

MR. McGHEE: Yeah. But it kind of --

MS. KENNEDY: So you don’t know the answer though?

MR. McGHEE: No.

MS. KENNEDY: Thank you.

MR. McGHEE: All right, we really appreciate you guys coming out tonight.

Thank you.

(Whereupon the Public Hearing was concluded.)

C E R T I F I C A T E

COMMONWEALTH OF MASSACHUSETTS

BRISTOL, SS.

I, MAUREEN D. PIRES, a Verbatim Court Reporter and Notary Public in and for the Commonwealth of Massachusetts, do hereby certify:

That the Public Hearing for the Mashpee Wompanoag Tribe was recorded by me and transcribed by me; and that it is a true record of the proceeding, to the best of my knowledge, skill and ability.

I further certify that I am a disinterested person to the action in which this proceeding is taken.

IN WITNESS WHEREOF, I hereunto set my hand and notarial seal this 11th day of December, 2013.

Maureen D. Pires
Verbatim Court Reporter
Notary Public

My Commission Expires
July 11, 2019

U.S. DEPARTMENT OF INTERIOR
BUREAU OF INDIAN AFFAIRS

PUBLIC HEARINGS FOR THE MASHPEE WAMPANOAG TRIBE

FEE-TO-TRUST ACQUISITION AND CASINO PROJECT

TAUNTON AND MASHPEE, MASSACHUSETTS

DRAFT ENVIRONMENTAL IMPACT STATEMENT

December 2, 2013, 5:30 p.m.

Mashpee High School
500 Old Barnstable Road
Mashpee, Massachusetts 02649

December 3, 2013, 5:30 p.m.

Taunton High School
50 Williams Street
Taunton, Massachusetts 02780

LINDA M. CORCORAN
COURT REPORTING SERVICES
P.O. BOX 4
KINGSTON, MA 02364
781-585-8172

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Tel: (978) 897-7100

David Hewett, LEED AP

THE MASHPEE WOMPANOAG TRIBAL COUNCIL
P.O. Box 1048
Mashpee, MA 02649
Tel: (508) 477-0208

Cedric Cromwell, Chairman

P R O C E E D I N G S

MR. McGHEE: Good evening and thank you for being here tonight. My name is Chet McGhee and I'm the Regional Environmental Scientist with the Bureau of Indian Affairs. I will be the facilitator at the public hearing this evening. At the table with me is Mr. David Hewitt from Epsilon, Inc. Epsilon is the BIA's Environmental Impact Statement consultant for this project. Ms. Catie Ferrara, also from Epsilon, is at the sign in table and will be assisting us during the comment period. Before we get started, I would like to recognize Chairman Cromwell of the Mashpee Wampanoag, and all of our elected officials here tonight. Thank you for being here.

If you haven't signed in, or signed up to speak, please get with Catie in the back. We would appreciate it if you sign in so that we can document your attendance here tonight. We will accept both written and spoken comments tonight, and we encourage you to make your thoughts known and provide comments. All comments will receive equal weight, whether they are spoken or written. If you decide to mail your comments, make sure they

are submitted prior to the deadline, which is January 17, 2014.

The purpose of tonight's hearing is to receive comments on the BIA's Draft Environmental Impact Statement for the purposed transfer of Tribal-owned fee property in Taunton and Mashpee into Federal Trust for the benefit of the Mashpee Wampanoag Tribe. The Tribe plans to develop the property in Taunton as a destination resort complex. The Tribe is proposing no change in land use for the parcels in Mashpee.

It's important for me to point out that I am not the decision maker on the fee-to-trust application. My role, with the assistance of Epsilon, is to make sure the decision maker is fully aware of all environmental issues before they reach a decision. Tonight's hearing is a very important step in that process and we truly appreciate your participation.

We would now like to invite the Mashpee Wampanoag Chairman, Cedric Cromwell for his comments on the project.

MR. CROMWELL: Thank you and good evening.

I am Cedric Cromwell, Chairman of the National Wompanoag Tribe. I would like to welcome everyone here tonight and thank you for attending. I would like to thank the Bureau of Indian Affairs for holding this forum tonight on the Draft Environmental Impact Statement on our land in trust application.

Acquiring the land that is the subject of this application is integral to the sovereignty and to the future of the Mashpee Wampanoag Tribe, and to the Wampanoag people that we serve throughout Southeastern, Massachusetts.

For thousands of years, Southeastern Massachusetts has become home to the Wampanoag people. As indigenous people, we have been the guardians of this land, and today we are here to protect and preserve it for future generations.

This has not been easy. Our long struggle for political sovereignty is well documented, and there is no need to repeat it this evening.

However, for the last thirty-five years we have focused our energy on being re-acknowledged as a sovereign Indian nation by the federal

government. This finally occurred in 2007. It is a step that has allowed us to move forward with the application for land in trust that is the subject of tonight's hearing.

This land identified in the application includes properties located here in Taunton and Mashpee, Massachusetts. This land is important to our people for many reasons. The Taunton property will be used for the development of a destination resort casino. It will be designed as a first class resort that we can all be proud of. It will generate revenue to the Tribe for the operation of our government and for the delivery of health and human services for our community.

The resort complex will also be an economic engine to Southeastern Massachusetts. It is located in an industrial park, in an area that has been designated for economic development by the people of Taunton.

It will be a source of employment and important economic benefits to our host community of Taunton, the Southeastern Massachusetts region, and the Commonwealth of Massachusetts as a whole.

The resort complex will also provide

revenue to support the Tribe.

It is important to note that we have a large service area. The Mashpee Wampanoag Tribe is responsible for providing a range of government services to thousands of Native American people throughout Southeastern Massachusetts.

We are also seeking land in Mashpee. This land will be used so we can govern and take care of ourselves, to provide economic opportunities and services for our people. It will be used for housing, health care, education, job training, cultural preservation and conservation of our natural resources here and in Mashpee.

The facilities will be sustainable and well designed. We have been and will continue to be good neighbors.

We expect during the comment period of this hearing there will be questions. Once the comment period ends, and everyone has been given the chance to weigh in, we look forward to addressing any and all concerns.

Again, to the BIA, thank you for being here tonight, and thank you to everyone who has come out this evening to be a part of this process.

We appreciate your presence here. Thank you.

MR. McGHEE: Thank you Chairman Cromwell. We will now ask Epsilon to give a short presentation on the project.

MR. HEWITT: Good evening everybody. My name is David Hewitt. I'm the Project Manager for Epsilon Associates. We are the contractor that led the consultant team in the preparation of the Draft EIS. It included many experts, Howard/Stein-Hudson for the field of traffic, Fay, Spofford & Thorndike for water and sewer, AKRF for socioeconomics, the public archeology lab, GEI, for groundwater and hazardous waste.

We're here tonight to take public comment on the Draft EIS. I'd like to take just a moment to run through where the requirement for the Draft EIS comes from and where we are in the NEPA process.

The Tribe has filed an application to have land placed into trust that constitutes federal action under the National Environmental Policy Act that requires preparation of an EIS.

The Draft EIS process, you may recall, we

were here in June of last year, we sort of kicked off the EIS process, we held scoping meetings where we came out and we presented a general overview of what the Tribe was proposing, and we accepted your comments to help guide us in what subjects and what areas of concern you have that should be included in the Draft EIS.

We've now done that. The Draft EIS was published for public notice in the Federal Register back on November 15th, and the comment period, as Chet noticed -- noted runs until January 17th.

Following the completion of the comment period, we will review your comments and use them to prepare the final EIS which will also be noticed in the Federal Register and followed later on by the Record of Decision which would then allow land into trust to proceed.

It's important for everyone to keep in mind that the Tribe's Land Into Trust application includes land both in Mashpee as well as in Taunton. I want to take a moment to just remind everyone that the EIS also considers the impacts of moving approximately a hundred and seventy acres comprising of eleven parcels in Mashpee that range

in size from quite small, you know, a tenth of an acre, up to about fifty-eight acres. Those lands include uses such as the Tribal offices, the museum, the parsonage, all the Tribe's various activities that occur there.

In Taunton, the Tribe has proposed that the area surrounding the Taunton -- the Liberty Union Industrial Park approximately a hundred and fifty-one acres, located just east of Routes 24 and 140 access from Stevens Street and O'Connell Way, the proposed site comprises seventeen parcels. It includes some existing uses. There's Work Out World, there's also a few small residential properties, and there's office property on the site as well.

I hope folks can see the graphics okay. I know some of you, if you're in the back, and having trouble seeing that, I encourage you to move up, but this slide is just an aerial. I hope people can get their bearings taking a look at this. You see Route 24 coming down from the top of the screen to the south. You see the railroad that cuts across the site, generally southwest to northeast that sort of bifurcates the site into two

halves. And you also see the entrance into the interior of the site that's provided from O'Connell Way off of Stevens Street.

It's important to remember when we're going to talk about alternatives under the -- under that or studying the DEIS that it includes moving the lands in Mashpee into trust as well. But I want everyone to take note that it doesn't include any proposed new developments in Mashpee. What the Tribe is proposing is to pretty much continue on with the status quo of existing uses. We're not proposing any real changes in land use.

The current development that's going on with the Tribe, the construction of the new government center, as well as some other proposed housing, is considered not to be quote, a connected action with the Land into Trust application. So those projects are allowed to move forward regardless of the outcome of this.

Under NEPA, you're required to take a look at a range of alternatives that covers sort of a spectrum. For this Draft EIS, we've taken a look at four alternatives for the site in Taunton, three development alternatives and a no action

alternative.

Alternative A is the -- quote, the proposed action, the proposed development. The Tribe is considering -- Forgive me for running through all these statistics, but it's probably the best way to get them on the record -- a four hundred thousand square foot casino with approximately forty-four hundred gaming positions. Gaming positions are just what they sound like. It's the number of people that are allowed to be playing at one time. So a slot machine is one gaming position. A roulette wheel would have more. A poker table may have six or eight or something.

It's just important to keep track of that, and it's gaming positions that a lot of the impacts are calculated, particularly traffic based on the size of the casino.

Associated with the casino would be three hotels, a total of nine hundred rooms, a number of dining opportunities, an events center, a water park that would be constructed north of the railroad, on the northern parcel. It would be approximately twenty-five thousand square feet. Parking would be both within a structured parking

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We did a fairly detailed analysis of the noise that would be generated by the casino's mechanical systems, things on the roof, air handling units, emergency generators, and the likes of that, and found that due to the distance of the site, where the casino is located to the nearby -- the nearest receptors that the outdoor noise generated by the casino would be well within the -- the State's guidelines, the DEP's guidelines.

In terms of visual impact analysis, we looked at that in several different ways. We did a GIS geographic information system, kind of a computer based study of where the casino would be visible from, from points around town. And I don't have those graphics with me. They're a little hard to interpret up on the screen, but I would

encourage everyone to go and take a look at the EIS to see where the analysis shows the casino will be visible, what points around town. Due to topography and forest cover, views of the casino are actually fairly limited.

Where the Draft EIS also takes a look at lighting and those types of things, due the way the casino is designed, there is some confidence that because of the set back of the casino from the edges of the property and the way that it has sort of an enclosed courtyard, a lot of the lighting impacts will also be mitigated.

We did a shadow analysis to see whether shadows from the buildings would be cast anywhere. Only in the late afternoons in wintertime would shadows be long enough to leave the site.

Finally, one of the major subjects that we looked at was, of course, traffic, which is everyone's concern. I am not the traffic expert, but I am going to try to convey the results of the traffic study and what I want -- one of the points I want to get across is that it is an extremely comprehensive study, a very large study area that was developed in consultation with the Mass. DOT.

So the Tribe's consultants proposed intersections to study, worked with DOT, and we expanded that to a total of fifty-four intersections, took traffic counts at fifteen freeway segments and nine interchanges.

The analysis looks at existing conditions, future no action conditions, future build conditions, future build conditions with mitigation for both Alternatives A and B. Alternative C was considered to be similar enough to Alternative A that we didn't have to look at that using a variety of traffic simulation techniques that's been (inaudible) under this in particular.

The study found that there's no getting around that a proposed casino would cause a substantial amount of traffic, the peak being on Friday afternoons, or daily on Friday where it estimates some ten thousand trips in and ten thousand trips out. The total is actually twenty-two thousand nine hundred and twenty-two trips per day. And that's the highest peak of any time during the day.

To mitigate for that increase in traffic,

the Tribe has proposed a very substantial traffic mitigation program, much of it was outlined in the Intergovernmental Agreement. It includes improvements at twenty-three different locations around Taunton with an additional thirteen locations that would receive emergency vehicle signal pre-emption.

Most of the mitigation is focused at the two interchanges on Route 140. Particularly Route 24 and 140 and at Stevens Street and Route 140. And the take away message for the traffic study is that with the Tribe's proposed mitigation in place, traffic operations at those two interchanges would be equal to or better than it is today under existing conditions. Even with the increased traffic from the casino, the proposed improvements may improve the level of service at all those locations.

That about sums it up. I was given the daunting task to run through the entire Draft EIS in a short amount of time. Obviously, we can't cover everything here tonight. I hope everyone's maybe had a chance to take a look at the Draft EIS. It's available online at MWTEIS.com. You're -- you

know, you're able -- It's a well-organized document. You're able to click on the particular section that you're interested in.

So if your interest is wetlands or wildlife or if your interest is noise or if your interest is traffic, you should be able to zero in on the topic that's of concern to you and not have to read all thousand pages of the draft.

And I hope everyone will take the time to familiarize themselves with the draft a little bit and to please submit your comments to us, and we welcome your spoken comments tonight. Thank you everyone for coming out.

MR. McGHEE: We will transition to the comment period. I would like to cover a few procedural matters before inviting individuals for public comments. Again, the purpose of the hearing tonight is to receive input from you on the environmental issues that you feel have or have not been adequately addressed in the Draft EIS.

With that in mind, there will be no question and answer period nor forum for debate. We are simply here to listen and get your comments on the Draft EIS for this project.

Please be aware that all comments will be recorded tonight and will become part of the official record.

The Final EIS will address the environmental issues and concerns raised tonight.

So for the comment period, we'll start by inviting elected officials for their public comments. We will then have Catie call five people at a time in the order that you signed up. When your name is called, please come up to the front row, and when it's your turn to speak, please restate your name and spell it for our stenographer.

Members of the public will be given three minutes each to provide verbal comments. We'll be using time cards and will enforce the three minutes to insure that everyone who wishes to comment on the document has the opportunity to do so.

If you don't finish your comments in the three minute period, you will have an other opportunity to come back up and finish your thoughts, and we'll stay here until no one has anything else to say.

I do ask that you're respectful when

making your comments. Threatening or obscene language will not be allowed.

So we would now like to give elected officials in attendance an opportunity to provide comments for the record.

So, Catie.

MS. FERRARA: The first elected official to comment will be Mayor Hoye of the City of Taunton.

MAYOR HOYE: Good evening. My name is Thomas Hoye, T-H-O-M-A-S, H-O-Y-E. I'm the Mayor of the City of Taunton, and I appreciate the opportunity to speak with you here this evening.

Almost twenty months ago, the City of Taunton and the Mashpee Wampanoag Tribe announced they were commencing discussions about the possibility of locating a casino development in our City, which would bring much needed jobs, development, and economic opportunity.

At the time, we knew that locating a tribal casino in Taunton would be difficult, given the number of significant steps that had to be accomplished under Section 91 of the Massachusetts Expanded Gaming Act. Section 91 of the Act

permitted the Governor and Tribe until July 31st, 2012, only five months from when we initially -- from when we initially commenced discussions with the Tribe to secure all necessary land and to enter into a mutually-agreed upon compact, obtain the General Court's approval of such a compact, and enter into an Intergovernmental Agreement between the Tribe and our City and obtain approval of both our City Council and residents by way of a referendum.

Despite this tight time frame, through the efforts and hard work of the Tribe, members of my administration, and members of our City Council, and with the affirmation and overwhelming support of our residents, I am pleased and proud that all these steps were accomplished on time in accordance with the Expanded Gaming Act and a true partnership with Tribal leadership.

The City of Taunton's Intergovernmental Agreement with the Tribe protects the City and its residents from potential adverse environmental impacts of the casino project, and requires the Tribe to make substantial payments to the City in lieu of property taxes.

Further, the Intergovernmental agreement provides for local hiring and purchasing preferences, requires the Tribe to consult with the City on the project's site and design, and calls for the formation of an Advisory Committee that will allow community input on matters encompassed by our Intergovernmental Agreement.

Our Taunton Municipal Council voted six to one in favor of the Intergovernmental Agreement. I also wanted to point out that several members wanted to be here this evening, but we have a very busy City Council agenda this evening, which prevents them from doing so.

Since entering into the Intergovernmental Agreement, we have continued to monitor the Tribe's progress and remain in contact with the Tribe and Governor Patrick's Office. The Tribe has continued its efforts in bringing its casino development to fruition including entering into a new gaming compact with the Commonwealth, completing a draft of its Environmental Impact Report, required under the National Environmental Protection Act, which is the subject of today's public hearing, and further developing and refining its architectural design

and construction plans.

3-1.1 The purpose of my appearing before you this evening is to express my continued support of my administration for this project. I also wish to state, as I have in other public hearings regarding the Tribe and this project, that the Tribe has fulfilled all of its promises made to the City, including paying all the City's expenses incurred by the City for its legal mitigation and other consultants.

Myself and my advisors are impressed by the thoroughness of the Draft EIA statement. It is voluminous and provides substantial details on a wide range of potential impacts that the projects may have on various aspects of the environment. The residents of our city need to be informed as to the project's potential impacts on our traffic, wetlands, groundwater, air quality, water supply, and a bunch of other factors that affect our quality of life in our city.

Because quality of life issues are so central to our residents, I have tasked our city consultants and our various city departments with reviewing the draft report in detail with providing

written comments to the BIA by the stated deadline.

In addition, our consultants have requested to provide my-- have been requested to provide my administration with their views on proposed alternatives to best mitigate any potential adverse environmental impacts in order to insure my administration that our intergovernmental agreement with the Tribe appropriately protects the City from these potential adverse effects.

I think it's important to point out that the land proposed to be taken into trust in Taunton comprises one hundred and fifty-one acres located within and adjacent to the Liberty and Union Industrial Park. In contrast to a “greenfield” project, which previously undeveloped and unzoned land is proposed as a site for the major project, the Tribe's proposed casino resort project will be located within an already existing commercial industrial park created in 2003.

Although certainly a major casino resort project was not contemplated in '03, the preliminary development plans demonstrate that the project site has ample public infrastructure, roads, power, and sewer and will accommodate this

3-1.2

major project while minimizing environmental impacts.

In closing, I wish to thank the BIA and its role as the leading agency in the Tribe's fee to trust application for its diligence and thoroughness in analyzing the potential environmental impacts of the Tribe's casino resort project. The City will continue to review and evaluate the DEIS in order to assure our residents that their quality of life will be protected and not adversely affected by this project.

Thank you for giving me the opportunity to speak to you this evening.

CATIE: Next is Donald Cleary, Taunton City Counsel.

Mr. Cleary is not here. The next will be Jessie little doe baird, Vice Chairwoman of the Mashpee Wampanoag Tribe.

MS. BAIRD: Wunee Nuhkan Musunune8ak, kah nutayushkoyanutam nuqunupeepushqanun Nutus8ees jessie quneeqaees baird. Neen sokushq wuta Maseepee Wopanay Chupan8ok. Nutay naneeswee ahqunahanut kah Maseepeeut kah nuwtomas Maseepeeut. Kumowunutyamun keehkut8konat

Numeenawutahkeemowuneamun. Y8 ahkee n8chee Cape Anne, ahqanee Merrimack seep8ut un sowanayuw Graftonut, un Blackston Seep8ut, pachee Narrangansett p8tapaqut. Wamee y8sh ahkeeash wuchee napo nees mutunok katum8ash numusununе8ak uwachonumuwowunash.

Good evening. Please excuse me for my turned back.

My name is Jessie little doe baird. I am the Vice Chairwoman for the Mashpee Wampanoag Tribe.

I live in both Aquinnah and Mashpee. My blood and my bones come from both of these places, and I am on the Mashpee Tribal roll, as were all of the women in my line before me.

We gather tonight to discuss lands within the Wampanoag National Traditional Territory. This territory begins at Cape Anne, follows along the Merrimac River to Grafton, Mass., then south to Narragansett Bay. All of these lands for twelve thousand years have my people occupied and cared for.

Tonight is the second of two days of historic significance for my people. We come to

gather comment because the Bureau of Indian Affairs will place some of our land within this territory in trust.

Because the BIA will do this, you may hear all manner of comments during this gather. You may hear that we ought not be treated the same and ought to be treated the same as those who had no aboriginal claim to this territory simply because their families arrived in this territory unannounced and stayed here.

You will hear from groups of people possibly claiming to be this Wampanoag Tribe and that Wampanoag Tribe. That will only be found in reference in any modern times since the passage of the Indian Gaming and Regulatory Act. You will hear from the xenophobes, possibly the skinheads, possibly the NIMBYs, the folks who were put off reservation land when their leases ended, and so formed a group to end all Indian rights, and possibly other hate groups east of the Mississippi, with every specious argument known to every single tribe that has followed this process since its inception in 1934.

You will also hear from the allies of the

Mashpee Wampanoag. The workers of the unions, people that want economic development and tribal citizens as well.

You will hear from those who have arrived here from Europe with their ancestors and occupied this land with their families for the past four hundred years and have done so in a fair and respectful way and who wish only justice for my people.

The one thing that I want to make clear, and the only thing that really matters to Mashpee Wampanoag in the end is this: Through all of the ages, Mashpee has remained, and we are still here on our land; and that we, the caretakers of this land, remain, and we will remain so for all time.

Assisting us in placing the land under our feet there in a protected way means everything to us.

Through the times of peace and plenty we were here. Before the time of the coming of the ships and the English we were here. And when the English came and other Europeans as well, we were here and remained here. We remained through the great sickness of 1616 that wiped out tens of

thousands of our Wampanoag nation.

When the Mayflower came to our territory and its passengers occupied our land, we remained here.

When our lands were parceled out among them and between them, we protested that we wanted justice on our lands and our laws and rights to respect it and follow it.

These petitions fell largely on deaf ears in the 1600's and 1700's, and yet we remained.

When our backs were pushed to the wall in the face of our lands appropriated and our children taken into indentured servitude, and when we could no longer be left in peace in our own homeland here, some of us went to war in 1675, alongside Metacom, our Massasoit.

This war is the bloodiest ever to be fought in North America.

Through this war, Mashpee remained, while many of our sister tribes fell victim and lost their people and were pushed from their immediate lands.

Two of the Chiefs involved in this war were Weetumuw and her sister Awashonks. Both of

these chiefs lived in the larger Pahkanahkut area. Awashonks in Pocasset and Weetumuw near Sowams. Weetumuw, the wife of King Philip, took her men into battle, while her sister Awashonks, the widow of King Philip's brother Wamsutta, whose people did not want to go into battle brought her people to neutral territory within the Wampanoag nation to remain with the Sandwich Indians for the duration of the war.

Weetumuw was captured crossing the Taunton River at Weeshqabut, which is also called Sqawbun (phonetic) today. All of her wampum was stripped from her body. She was stripped naked, she was dragged to Taunton Green, where she was decapitated by the English, and her head was hung there on a pike for twenty years. Her husband Metacom's head was placed on a pike in Plymouth on Cole's Hill.

Her sister Awashonks returned home as was promised by the English to Pocasset after this war, only to find her lands were given away to Indians of various tribes and nations that fought on the side of the English.

Some of her people remained new

Weeshqaput and the rest returned to the Sandwich Indians. Those Sandwich Indians were also known as the Mashapoag Indians and the Marshpee Indians, and today the Mashpee Wampanoag Tribe.

We are a people directly tied to both Mashpee and Taunton through our blood. The Pocknett family name bears witness to our people being of largely Pahkunahkut area. We still remain through all of this. When our children were taken away from us and sent to Carlisle Indian School in Pennsylvania in the beginning of the 1900's, we still remain.

When the Court told us in the 1970's that we had become extinct and no longer existed, we still remained and held fast to our territory. And today when we hunt and fish and are ticketed and beaten for exercising our aboriginal right, we still remain.

3-2.1

We, Mashpee, shall remain for all ages to come. We will never forsake our territory, or our lands, or our rights. We will thrive when all around us fall in our wake because we are created from this ground. We are this ground. We are the land, and we will use every tool that we can to

grow our nation.

And as long as we keep our responsibility to Creation to remain on our territory, we shall have the protection of Creation as long as Mashpee Wampanoag breathe. By any means necessary, we shall remain on this land.

I now welcome you all here to Wampanoag territory and on behalf of my people, we invoke our ears and our minds to what others have to say, and we look forward to learning. Unach.

MS. FERRARA: Next to speak will be Keiko Orrall, representative of the Twelfth Bristol District.

MR. McGHEE: And while we're waiting for our next speaker, if we could not have the applause. I know there are people that are for the project, there are people that are against the project. Our goal was to create a mutual environment so that anybody that has comments feels comfortable sharing them. So if you could just not have the applause.

Thank you.

MS. ORRALL: Thank you. My name, is K-E-I-K-O, last name O-R-R-A-L-L, and I am the State

Representative for the Twelfth Bristol District and the area where this proposed tribal casino lies. I'm also the representative for the adjacent towns of Lakeville, Berkley, and Middleborough.

And I appreciate the effort that has gone into putting this Draft Environmental Impact Statement together. It seems like a very thorough document, and the website is easy to use as far as clicking through and finding the area that you are interested in.

3-3.1

My concern is that in the Executive Summary, and on the website, I did not see anywhere -- and I could have missed it because it is a lengthy document -- I did not see the towns of Lakeville, Berkley, or Middleborough mentioned at all. And so I am here to address my strong concerns that if there is any further proposal, any further impact statement that those are included.

One area of great concern is the lack of certainty for the mitigation that could be provided if the Mashpee Compact is to move forward. And they agreed to allocate a portion of the gross gaming revenue to address mitigation impacts, but there's no real basis for assessing mitigation in

3-3.1 (cont.) this amount, because there haven't been any studies done to assess the mitigation for surrounding areas prior to this. The -- as well, the Towns that I represent do not have a way to pay for any type of dispute that they may have with the findings.

The second area of concern is the water issue, and the impact that it will have on the Assawompsett water -- the Assawompsett Pond complex.

The Town of Taunton's Water Supply comes from Lakeville. The Assawompsett Pond Complex is

3-3.2 located in Lakeville. There has not been a safe yield study done to show that the full amount of water taken from Taunton would have no impact on the surrounding communities on the wells or any type of surrounding impact from that complex. So that is -- I did not see that anywhere noted in the document. So I'm very concerned that a safe yield study, especially with a proposed water park, that definitely should be addressed.

3-3.3 The officials in the region also believe that as neighboring towns, the issues associated with a resort casino will be significant, and to varying degrees will impact their public safety,

3-3.3 (cont.)

their police, their fire, their roads, and their schools.

Again, while the City of Taunton has negotiated an Intergovernmental Agreement with the -- the Tribe has not provided for the surrounding towns of Lakeville, Berkley, and Middleborough.

It's unclear how with the Tribal Compact moving forward, if it were to move forward, how even the Mass. Gaming Commission would determine how that is split up for the surrounding communities. So that is not clear.

3-3.4

The -- the fourth area would be the transportation issue. Nowhere in the Executive Summary are the transportation issues or in the -- the chapter part of Transportation did I note anywhere the Route 79 interchange with 140. That's the very next exit down from the -- where the proposed site is. And that will have an impact, and I'm not sure why that it's not -- it's not noted anywhere. Berkley and East Taunton and Lakeville will be impacted on that Route 79. So, that's another area of concern that I am hoping will be addressed in any final proposal.

My final area of concern is that there is

3-3.5

already an agreement, an Intergovernmental Agreement with one of the towns that I represent. In 2007, this Tribe entered an agreement with the Town of Middleborough. The Town of Middleborough does not believe that that agreement has been resolved. So to their -- they have not -- the agreement has not been terminated, and it's unclear of their standing with the Tribe. So that's something I would certainly encourage the Bureau of Indian Affairs to take into serious consideration in moving forward that any issues with Middleborough are resolved.

I want to thank you for your careful consideration and your examination of the areas of concern.

It's imperative that the communities that are represent are heard. Lakeville, Berkley, and Middleborough. I -- I also represent East Taunton, and this is mainly an East Taunton focused issue. I understand that. But it will have impact on the surrounding communities.

3-3.6

And so I would encourage you, I would ask you, I would implore you to please, in any final document, consider what the impact will be on the

3-3.6 (cont.)

surrounding communities.

Thank you.

MS. FERRARA: The next to speak, and the final elected official that I have on my list will be Allin Frawley, a Middleborough Selectman.

MR. FRAWLEY: Good evening. My name is Allin Frawley, A-L-L-I-N, Frawley, F, as in Frank, R-A-W-L-E-Y.

First and foremost, I'm a resident of the Town of Middleborough. I also serve as a Selectmen, Vice Chair of the Board of Selectmen in that town, and I've been involved in this process for far too long, since 2007 listening to this.

3-4.1

First off, I'd like to start on a positive note, and I just want to say that I fully support and agree with Alternative D.

And that being said, I've tried -- I've run through some of this report. I haven't read the whole thing, but I find so many half-truths, misstatements, lies of omission, and outright lies that this report, in my estimation, can only be described as fraudulent.

My first thought was actually criminal, but fraudulent works. It's grossly inaccurate, so

I don't (inaudible).

3-4.2 In the fourth line of the 1.2 Purpose and Need, the statement that the Tribe of the Mashpee Wampanoag is located within the Mashpee Wampanoag Tribe's aboriginal homeland simply is not true. There were two other Indian tribes who prepared a statement to that effect at the last meeting, and that statement in your report is unqualified. After that statement you just leave it and then you move on. But it's simply not correct.

3-4.3 Under Section 1.3, 1.3.1 Mashpee, really doesn't have too much impact on me, but the proposed action does not include foreseeable (inaudible) development of the Mashpee parcels, that cannot be true if the Land in Trust Application is asking for the ability to gain Wampanoag lands in Mashpee that would not be in a Land into Trust Application. If this statement was true, it simply doesn't jibe with what is fact and what is said in the report.

Moving on to Section 4.2.2, previous sites considered. I agree from there that this is --- that the Tribe entered into negotiations with

3-4.4 the Town of Middleborough. What they failed to

3-4.4 (cont.)

state is that they didn't complete those negotiations, they signed an Intergovernmental Agreement with the Town of Middleborough, and then stated on numerous occasions after that fact that they were fully supportive of the project as they moved forward in Middleborough.

To this day, to this moment in time, we have not received one notice from the Tribe as a town saying that they were no longer pursuing land into trust in Middleborough. And I had asked the Tribal Chairman to his face, on numerous occasions, and he's never once told me yes or no. The last official report -- or official correspondence that we received -- the Town received from the Tribe said that it looked forward to pursuing land into trust in the Town of Middleborough for our mutually beneficial (inaudible) venture.

We have not received any termination -- determination by any of the Intergovernmental Agreement signed by your own Tribal Chair and the Tribal Council, which Mr. Cromwell is a part of, and the Town of Middleborough. There's a termination clause that has never been fulfilled. They are not in negotiations for a settlement in

the Town of Middleborough. Much to their -- much to everyone's surprise that they continue to say that. It's simply not true, whether it's a misstatement or a half-truth of what this report is saying.

Further on, on the environmental consequences, Taunton, 8.1, the transportation. It is stated by someone that the -- there is no mitigation necessary at the Middleborough rotary, and that there's a project being planned to begin in 2016 for a total cost of thirteen point six million dollars. That is simply not true. There's talk of something like that, but there is absolutely no concrete proposal that has been accepted by the State.

3-4.5

I have spoken to the -- Secretary of Transportation Davies about this on numerous occasions. There is no conclusive alternative or plan for that rotary at this time. You simply cannot write a report and make something true by citing it. It's not true. That rotary needs to be mitigated if this project is going to move forward.

Those are the things I found just in the few hours I had to go over this report, and

certainly I will be submitting written comments by January 17th to Mr. Keel. I feel like I know that address by heart at this point in time.

If I can paraphrase former President Regan, (inaudible) you have to be daunted to support as the truth because four sentences into the first section there's a half truth there. There are three other half truths. This is not -- most of what I've come across already is not fact. It's simply not true. They're not going to move forward with these half-truths in this report.

Thank you.

MR. McGHEE: Are there any other elected officials present that would like to speak?

(No response)

Okay. We'll move into the public comment period. We'll now ask Catie to read the first five names. Please remember, when you hear your name, come up to the front row, identify yourself at the beginning of your remarks, and spell your name for the stenographer.

Catie.

MS. FERRARA: The first five to comment will be David Fenton, Dorothy Latour, Sheila Cook,

Stephen Bingham, and Frank Lagace.

MR. FENTON: My name is David Fenton, D-A-V-I-D, F-E-N-T-O-N. I'm a resident of Taunton. I'm a business manager, electricians, IBEW, Local 223, and a delegate to the Southeastern Mass. Building Trades Construction (inaudible).

3-5.1 I'm here to support the project. This project has been under thorough review of the past -- at least a year, and it's been in the process here for, as Mayor Hoye said, for approximately twenty months.

This project would create jobs that are desperately needed in Southeastern Massachusetts. This project will create construction jobs that have been needed for the last two to four years in this area.

This proposal has been reviewed and it's been long -- thorough as a previous elected official spoke of. They made sure that everything was looked at. You looked at the traffic, you looked at the water, you look at -- Everything that was supposed to be looked at was looked at in this report.

This project has the support of the

community, the support of State government, and the support of local government. Hopefully the federal government will see fit to throw its support behind this project also.

I thank Epsilon for the thorough work that they've done on this. This is going to be a proposal that's going to help Taunton, Southeastern Massachusetts, and the Mashpee Wampanoag Tribe.

I look forward to this project coming to fruition. It's been a long time coming. And I welcome to be a part of it and welcome to work with the Mashpees and the City of Taunton on this project to get going forward.

Thank you.

MS. LATOUR: Dorothy Latour, D-O-R-O-T-H-Y, L-A-T-O-U-R.

3-6.1 I'm just a citizen and I don't have much. I just want to say that look what Governor Patrick said, that he wouldn't want this in his backyard, and I don't want it in mine either. And I notice that he's also using State funds to fight the proposal for Martha's Vineyard. So, while I don't appreciate it but I feel like it's an insult to the intelligence of the people of Taunton. Why should

3-6.2

we be approving a casino? It's such a small community and the air quality in Taunton has gone from D to F.

Now, this is from the Fall River Herald News. This is April, and this is the asthma and heart problems because of the air quality in Taunton that's a direct result, and this is a scientific paper that I will turn in to you.

And as far as jobs, I'd like to see light manufacturing, but not a casino.

Thank you.

MS. COOK: Sheila Cook, S-H-E-I-L-A, C-O-O-K.

Gentleman. I work for a nonprofit agency in town, and I teach culinary slash entrepreneurship programming to Taunton area high school students who aren't doing particularly well in the school. We provide career mentoring, career guidance, and my programming, which is either learn to work or work to learn.

Last June, when the casino vote was taken, the majority of citizens of Taunton voted for it. Those who were opposed to it previous to the vote and still today mention that the jobs,

though they will be three thousand, are only minimum wage jobs.

I teach culinary students, and some of them receive their food handler's certification for the State of Massachusetts. And contrary to what you see on the celebrity chef shows, most people who work in the culinary industry begin by doing so as an intern or as a low pay minimum job worker.

3-7.1

Those three thousand jobs mean everything to me because I deal with the students who are not probably going to college or going to college at any time, and the jobs are -- we have no jobs in Taunton. The jobs are extremely important. I think they would be good jobs.

And the other thing about them being minimum wage jobs, unlike if you go to work at McDonald's where there's twelve worker bees and only one manager, if you go to work for a casino resort, you have the opportunity to move from that minimum wage job up into an internship as a manger, subsequently a manager, maybe over to hotel management, perhaps there will be some educational benefit available to employees.

So, as you can tell, I'm here to speak

for those minimum wage jobs and for the students of Taunton who need them.

Thank you.

MR. LAGACE: Good afternoon. My name is Francis Lagace. F-R-A-N-C-I-S, L-A-G-A-C-E. I live at 36 Stevens Street in Taunton, Massachusetts.

This thing is going to be an eighth of a mile across the street from my house. Right now my mind is racing, my heart is pounding. I want to make a statement now and return to make a comment later because I can't organize my thoughts.

Jessie little doe baird has offended me because I'm trying to protect my home. She has, in fact, called me a genocidist (phonetic), if that is a true word. She also stood here and spoke in her native tongue, which most people in this room do not understand. (Inaudible) and I'm not trying to (inaudible) but speak English. I didn't understand a word of what she said. I doubt you did. Did you?

MR. HEWITT: No.

MR. FENTON: The first lady was very inflammatory (phonetic), had nothing to do with

environmental impacts. Nothing to do with noise (inaudible).

3-8.1 I ask you to please restrict this night to environmental impact because I don't want to be here until midnight (inaudible) and I'd like to return after for comments (inaudible).

Thank you.

MR. BINGHAM: Good evening. My name is Steven Bingham. I'm a Mashpee Wampanoag. I just wanted to read a statement.

Our tribal sovereignty is limited today by the United States under treaties, Acts of Congress, executive bodies, federal administrative agreements from court decision. What remains is nevertheless technically maintained by the currently recognized tribe (inaudible) encroaching by other sovereigns such as states.

Tribal sovereignty insures that any decisions about the tribes with regards to the property and services are made with their participation and consent.

You know, I see there's a little problem with transparency. We were in Middleborough, that was in March at the time. Now we're in Cromwell's

town. And we've written, my mother and I have written numerous amount of letters to the BIA and the President of the United States, that everyone involved should have his action investigated. All right.

This lack of transparency, when Cromwell ran for office, he said I'm going to be transparent, I'm going to be fair, I'll let everybody know what's going on. We, my mother and I, had the FBI and the IRS come to our house. We showed them information about malfeasance by Quinn (phonetic) Marks (phonetic). They looked at it, they left. And we said, you going to take this with you. They already knew it. I said, well, what's taking you so long? What's the procedure? They just said the Chairman from the Pequot's in jail for malfeasance. That was in 2007 to 2009. This is going on 2014. And he’s gone to jail. I don't know if they investigated him or what, but there's lack of transparency from everyone. The State. It's what was the tribal lands. And I think this needs to be address before this land is to be put into trust.

3-9.1

Thank you.

MS. FERRARA: The next to speak will be Brian Weeden, Peter Fernandes, Michael Callahan, and Brian Kennedey.

MR. WEEDEN: My name is Brian Weeden, B-R-I-A-N, W-E-E-D-E-N.

When -- good evening. My name is Brian and I am from Mashpee.

Today I come before you to speak on not only on the Tribe's behalf, but to advocate for our tribal youth. In the Wampanoag language, (dialect), means my blood and my bones is from this land, but when we drink and sleep from that -- when we drink and sleep from that land, you are the land and the land is you. As native people, we are to take care of Mother Earth, who takes care of us by helping sustain us as a people.

I was raised to be proud of who I am and to care for the next seven generations as my ancestors have done before me. Over ninety years ago I would have been taken away to Carlisle Indian School in Pennsylvania. There my hair would have been cut off. I also would have been forbidden to speak my native language. But most importantly, taken from my home.

However, today I can proudly speak my language. Today, I can proudly wear my hair long with pride, not only as a Wampanoag man, but a young native man. But the one thing that I'm missing is my land and I ask that the Creator watch over you all and help in this review process to protect the next seven generations to come. 3-10.1

MR. FERNANDES: Peter Fernandes, F-E-R-N-A-N-D-E-S.

Hello. My name is Peter Fernandes and I support this destination resort project that's going to end up in the Liberty Union Industrial Park here in Taunton. 3-11.1

In late February of 2012, when I -- when we first heard about this project, I thought it was a great opportunity for the City to experience a little bit of economical growth that its been lacking. I thought the project being within the City would be more beneficial than it to be on -- between adjacent community.

As I began -- as I began getting involved, like many other Tauntonians in late March to support this project, on June 9th of 2012, the residents of Taunton, they voted sixty-two percent

for this project. With the support of the voters, the Mayor and local City Council, or eight out of the nine city councillors, the local government was able to move forward with the Tribe to actually come together with the International Government Agreement. And what's included in that agreement was over thirty million dollars -- will be thirty million dollars of capital improvements to the City of Taunton, an annual payment to the -- to the school -- to the school system. There will be a minimum of eight million dollars coming into the city coffers, and then also the Tribe has already fulfilled their agreement with paying the one point five million dollars in August of 2012.

Throughout this whole process, the Tribe and the City have worked hand in hand resolving issues that have come up in the past. One being that there was an issue that came up with the Governmental Agreement with the TMLP and where the power would be used. The Tribe had said that they would be using the TMLP as their source for power. The other was also that there was a local church that was actually finding some hardship as far as what their bingo revenues would be, and the Tribe

had agreed to that. They continued to try -- they continue to work together with the City. And what they said, staying true to their word, they've been involved in the community. Last year they actually -- they were the main supporter of the Boys and Girls Club. This year they were also involved. They're actually going to be supporting the Hundred Years Lights On in Taunton. They've been involved in the Chamber of Commerce and -- and they've also donated to the -- to the Taunton Autism Awareness Committee.

In closing, I would like to say once again that I think this is a great opportunity for the City, and I think the -- I'm sorry -- for the City, for the Tribe, and the surrounding communities. I think if we continue to try and work together, this could be a project that everyone will be proud of. Thank you.

MR. CALLAHAN: Mike Callahan, C-A-L-L-A-H-A-N.

Hi. I'm a resident. A bit of a clarification on the whole IGA process. As far as -- as far as I know, the -- well, this open session covers everything that the Tribe wants to have for

3-12.1 land into trust. Now, the Tribal State Compact, however, differs dramatically from the IGA and from the scoping report. In the Tribal State Compact, they list tax parcels 11841, parcel 1265, 11839, 11880. That is the main parcel, the Sears parcel, the Macy's parcel and the north parking lot parcel of the Silver City Galleria Mall. The mall itself is huge in this area. It consists of thousands of jobs, a lot of parking lot and traffic issues, a lot of energy and resources used by the Town. And for it to be totally ignored in the scoping report, yet it is in under lands in Taunton in the Tribal State Compact is cause for concern for many people in the area. Some have said oh, they tried the mall land, but they didn't come to an agreement. Well, then it should have been removed from the Tribal State Compact. It has not been. Many times -- they had two shots at this state compact and in both cases this still remains in the Compact. And its laws are written inside. It is the writing of the law that is -- takes precedence.

So the scoping report should have dealt with those parcels. They have not. They have not dealt with the traffic, the economic structure, the

power, the -- anything about that huge section of East Taunton land.

3-12.2 The second point that I'd like to make very quickly is as I looked over this report, I was initially concerned with the bus schedules and the traffic in the local area. The roads that are in the scoping report are used by the Taunton High School, Coyle-Cassidy, Bristol-Plymouth, the (inaudible) School, East Taunton Elementary, Martin Middle School, and Parker. That is a lot of busses traveling up and down on those roads, and just widening one or two intersections is not going to solve -- is not going to help speed up the traffic that's going to be coming in. It's only a small percentage, says the report. That small percentage will throw off the times of the busses significantly. Kids will have to get up twenty minutes earlier, and they'll get home ten to twenty minutes later. Nowhere in the report has that been dealt with. So widen the road a little bit here, maybe we add (inaudible) schools. It doesn't deal with the time that all the students in this area have to deal with in getting up and going to bed, and going home from school. Additionally, there's

the after school busses, all of these. The roads are used constantly by busses. That was not addressed in here.

So those two things I would like to have addressed, especially the mall. It's in the compact, but it’s not mentioned. It's too huge to ignore. I would like you to look at the Compact or have it be dealt with.

And pretty much my time is up. Thank you very much.

MR. KENNEDY: Brian Kennedy, B-R-I-A-N, K-E-N-N-E-D-Y.

Now, I sent a letter to the BIA during the previous session about a year and a half ago, and my understanding is this session was we would be going to be going over what did you see in the draft EIS, what did we not see. So most -- most of what I had written about as far as schools and timing had been brought up by other people.

I am going to specifically go over something I did not see, which is about inflation. Now, I don't know what you call it in our state politics, but they like to tie things to inflation now. And one of the things they don't have tied to

inflation is our Intergovernmental Agreement. So basically what needs to happen as far as socioeconomic concerns is hopefully if the Tribe does get their land into trust, eventually they have a CPI increase of three percent for ten years, and then stays fixed at that level. So essentially any of the fixed payment on the CPI, the other revenue aimed to taxes, the City of Taunton receives is two point zero five percent on net slot revenues.

3-13.1 And you know you can only get so much gaming revenue from forty-four hundred gaming stations. So, in that effect, the absolute value that the Casino can have for the City of Taunton on those revenue streams is fixed.

But as we all know, this is -- they are essentially appealing to you, the federal government, to give the parcel of land forever. And since inflation would go out throughout perpetuity, I wanted to know, is there any recourse that you have where with the CPI continues so that there is some -- there is some inflation that goes with it on those payments? Because what's going to happen is this is a deal forever. So fifty years

from now if they're still making an eight million dollar payment and they're paying the CPI based on the tax rate forty years ago, that is a serious concern for our investments.

And as the mall was just brought up, if they take additional commercial properties that are not used for gaming, we don't have access to any of those revenues. (Inaudible) as that's part of the agreement as sovereign you said we are entitled to (inaudible) with the Intergovermental Agreement and we're not entitled to (inaudible). It’s different from a commercial entity.

3-13.2

So I wanted to know if there was a specific way -- I'm not sure -- based on the socioeconomic impact, is there any way we can get this inflation adjusted -- just having (inaudible) like Prop Two and a Half, like the rest of the city, something to that effect. If there's any way you could do something like that.

And one other issue I just wanted to touch on briefly is just the issue of trust. Again, we had the Selectman from Middleborough, Mr. Frawley, who (inaudible) with Middleborough. Middleborough is not anywhere (inaudible). And as

far as an issue of trust, I recently ran for office here in the City. I (inaudible) -- I was unsuccessful. And if I was successful, I would be working with the Tribal Council members. And it deeply offends me that a fellow elected official from the Tribe to say that anyone who doesn't agree with their project is essentially a xenophobe. That's -- that's an absurd and ridiculous statement. Words cannot express how ridiculous that is that they would completely drown out whoever opposes, wherever they might be. If you want to be involved in the community, you want to be a part of it. You don't want to be a parasite or xenophobes.

MS. FERRARA: The next to speak and the last signed up speakers that I have on my list will be Michelle Littlefield, David Littlefield, Terry Quinn, Richard Shafer, and Tall Oak.

MS. LITTLEFIELD: My name is Michelle Littlefield, M-I-C-H-E-L-L-E, L-I-T-T-L-E-F-I-E-L-D.

First of all, I submitted two letters today. One from Anthony Lacourse, who is also a resident of East Taunton. And Mr. Lacourse

actually Commander Lacourse, who is stationed in Europe as part of Operation Enduring Freedom was not able to be here tonight, so he asked that I read this into the record. But I did submit it, so I supposed that's not necessary.

But I do want to just state that his letter is in reference to historical information not only of the local community but the State, Federal, and Native American Historical concerns. And he's asking that a complete archeological and environmental impact study be completed and an Army Corps of Engineers evaluation be completed prior to authorizing land in trust. So I've submitted that.

3-14.1

In addition, I brought my own letter that simply states -- I submitted a letter last June, 2012, publicly spoke at the hearing, regarding -- along with other residents, regarding the numerous issues that we feel will affect the community.

Unfortunately, after reviewing both the Draft Environmental Impact Statement for NEPA, the BIA, as well as MEPA, Massachusetts Environmental Protection Agency, I find that the one that was done for NEPA was grossly inadequate. There are numerous topics that were not covered sufficiently

3-14.2

or were not covered at all. Attached I've put an eleven page list of questions and comments, and I've listed them subject to the numbers that you have in your report so that you can match it up. But in the -- it all surrounds coastal environmental barriers, flood management, historic preservation, noise abatement, hazardous materials, airport hazards, which was one that concerns us greatly, water, sewer and sanitation. One thing that I couldn't find anywhere in the report was in regards to fire safety. That was a big concern of ours. Environmental justice, unique natural features in areas, site suitability, air quality, soil condition quality, stability, erosion, and drainage. Nuisance and hazards. Roads, traffic and transportation. And again, I listed them out. I know that Selectman Frawley brought up one, Middleborough rotary, as well as our State Representative Keiko Orralll has also brought up the concerns of Route 79. There are a couple of areas that were missed completely; and then there were other intersections and other traffic concerns that -- that were addressed, but not sufficient. So I pointed all of those out.

3-14.3

Children, schools, parks and recreation. One of our biggest concerns is that the entrance from the casino to our local elementary school that services almost a thousand children is three hundred feet apart. Obviously, that's a huge concern. Light and glare, commercial and/or retail ancillary uses. Housing overnight tourist accommodations. Local economic impacts. One of the things that concerns us greatly is that not only are we talking about a proposed casino, but they're also going to have restaurants and retail shopping centers. They don't address how that is going to impact the existing businesses that we already have that already employ thousands of people, will that -- you know, will that -- will there be an impact on those businesses as well?

3-14.4

3-14.5

Law enforcement, crime, public safety. And the only thing that we did find was alternative site analysis seemed to be very in-depth.

I do want to just say real quick thank you to the Chairman Cromwell for staying tonight because often in the past we have addressed an empty room, and I appreciate that the members of the Tribe actually stayed tonight to listen to our

concerns. We're almost two years into this project, and for the first time in two years, they've heard what I've had to say. So I appreciate you being here and listening as well.

Thank you.

MR. QUINN: My name is Terry Quinn, Q-U-I-N-N, and I am a supporter of the destination resort casino in Taunton. I'm a resident of Taunton and a business owner in Taunton. And I did speak on this project back I think it was in May, and just one -- there's one thing, back in May I mentioned the unemployment rate in the State of Massachusetts. I said the unemployment rate was seven percent in Taunton. Today the State of Massachusetts says the unemployment rate is seven percent in Taunton. No change. So there was -- I think it was around nine percent, ten percent in Fall River. Today it's eight point nine percent. Basically, there is no movement. You know, and this project is three hundred fifty jobs on day one, a thousand construction jobs, twenty-five hundred permanent jobs. It's something this community needs.

I understand this is about the

3-15.1

environment impact. How many businesses come to Taunton, come to your community and mitigate everything from traffic to construction? Just a quick review of the IGA, you know, over six -- traffic improvements, there are sixteen roads or intersections, water system infrastructure improvements over two million dollars. Sewer infrastructure improvements over seven million dollars. Wastewater recreation onsite, no burden to the City of Taunton.

And in the IGA itself, it states stable development, construction principles and environmentally friendly construction methods. I mean they're looking out for the environment. It's in the IGA. It's part of the plan.

Just in closing, the community needs this project, the Tribe needs this project, and the citizens of Taunton voted overwhelmingly for this project. So I hope that you can continue to support it, support the citizens of our city.

Thank you.

MR. LITTLEFIELD: Good evening. My name is Dave Littlefield. It's D-A-V-E, L-I-T-T-L-E-F-I-E-L-D.

I'm an East Taunton resident. I looked over the report and my concern is about the airport. And I have to concur with Selectman Frawley that these are hollow answers; they're not accurate at all.

My question was anticipating there would be unnecessary mitigation pertaining East Taunton Airport, and the response as anticipated, it would generate very minimal if any additional air flow traffic, and it doesn't warrant mitigation.

3-16.1 Another question was about the noise disturbance -- the noise disturbance from the airport. And it says that it's not anticipated the

3-16.2 casino would generate an increase in air traffic. And again, how would it -- how would the impact of increased air traffic area be studied. And it says again it's not anticipated the casino would generate a significant increase in air traffic. These are safe answers. This is like we don't want to look at this, so we don't think it's going to happen, we don't think it's a problem.

3-16.3 Here's where your problem lies. In 2008, the Governor wrote an opposition letter to this very same Tribe for land in trust in Middleborough.

3-16.3 (cont.)

Pretty much everybody knows that. The Governor was very concerned about this same issue, with an airport that was twenty miles away. You're talking about one that's at the end of a runway less than two miles as the crow flies, so there is some concerns there.

I'll read what he wrote on Page Fifty-two, on February 5th, 2008, and this is the opposition letter to the Mashpee Wampanoag's land in trust application.

With the approval of the land in trust in the construction of a casino in Middleborough, airports located in neighboring communities, such as Plymouth, Taunton, New Bedford, Mansfield, and Norwood could experience a significant increase in air traffic, including jet, multi engine drum turbos and multi engine piston aircraft. With the presence of a resort casino in the area, if nonresidents choose to travel by private plane, neighboring communities could also experience an increase in larger single engine six plus passenger aircrafts with smaller single engine aircraft. Additional impacts could be experienced as far removed from the Middleborough land to Hyannis,

Worcester, Logan, and Hanscom Field.

A feasible study would need to be undertaken to determine potential impact on air traffic. Any increased traffic could result in additional requests for financial support from the airports for runway extensions, runway improvements, lighting improvements, instrumental approach, ramp park and expansions in tie downs, additional hangars and increased fuel capacities. The FAA will not be able to support many of these projects due to funding levels and therefore this project may require significant investment on the part of the Commonwealth. That will be us, the taxpayers. The Commonwealth respectfully requests the Secretary not approve the Tribe's application as an enforceable agreement between the tribe and the Commonwealth that assures the necessary transportation improvements comply with NEPA, MEPA, and all applicable federal and state law regulations.

Now, we're in Taunton, so I contacted the FAA. I've also spoken to Secretary Davies, which is this Route 24, that's something different; I'm talking about the airport. But I have spoken to

3-16.4

the FAA. They have nothing from this Tribe. They have nothing from the State, nothing from anybody telling them to do an analysis of approval. And that's FAA 7460 Part 77, which requires that a notification of analysis of approval be done prior to commencing and constructing the project. And the answer to that is when the spike in building designs have progressed sufficiently, applicable notice will be provided. So my question to you would be at what point is this project going to be significantly progressed -- sufficiently progressed that somebody's going to notify the FAA, they're going to come down and do a study and determine this.

3-16.5

Now, in your report, there is something about lighting. See, this has to do with noise, traffic, and lighting. And lighting is something about the reflecting of the buildings may cause some glare to the pilots. That's all that's touched on. Nothing else is touched on.

Unfortunately, somebody has to do a report. Somebody has to do the work and do a study, and it's going to be up to you, the federal level now, to do that because clearly the

Massachusetts level has failed.

Now, to tell me that this isn't significant or that it's not important, it was important in 2008 to the Governor -- the same Governor of the State.

Thank you.

MR. SHAFER: Richard Shafer, S-H-A-F-E-R. I'm part-time project manager for the Taunton Development Corporation, the developers of the Liberty Union Industrial Park, a fifteen million dollar project that commenced in 2003.

The TDC at the time to build the industrial park with several million square feet of industrial buildings to build out commenced and completed a State MEPA report, received a certificate from the State to commence the industrial park project.

The TDC working with the City, has optioned its remaining fifty-three acres of the three hundred fifty acres to the Wampanoags for the -- for their project. That area, we understand, the majority of that area will be for a future water park.

The impacts of this project, being

3-17.1 different than industrial have been looked at, and in many ways may be less impacting than a full built-out industrial park. There will be other areas where the impacts may be greater. But we feel strongly that it's a good project for the City of Taunton and we support it.

3-17.2 We also feel that in the traffic mitigation, one of the areas that should be looked at as well as the roadways, the roadway system where, thanks to Barney Frank -- Representative Barney Frank, we put two million dollars into that Route 140 and 24 interchange.

3-17.3 In addition to that, this is near the future commuter rail station. We feel like the commuter rail station will help mitigate some of the traffic concerns, especially if it's accessed both to the Taunton Station and the Lakeville Station. So we think that should be taken into consideration.

So, it's not an industrial park. It's a greater and different change, not too dissimilar than when the City had industrial property changed to the Silver City Galleria across Route 24 and 140. So it's a change, but it's change that TDC

whose members are all volunteers working forty years in this community have supported.

Thank you very much.

MR. McGHEE: Okay. Is there anyone else that hasn't spoke that would like to now?

TALL OAK: Can everyone hear me? My voice is not ordinarily loud unless I get annoyed.

I'm here tonight to talk about respect. What's central to this whole --

MR. McGHEE: Could you state your name and spell it for the stenographer?

TALL OAK: I'm getting to that.

MR. McGHEE: Okay.

TALL OAK: Now, I'll identify myself first geographically, okay? I traveled nearly a hundred miles to come here tonight, without much sleep, at the age of seventy-seven, with braces on both legs, because it's important to me to be here.

Now, I am genealogically Mashantucket Pequot, a name I'm sure you've heard, and Wampanoag. My wife is a Mashpee Wampanoag Indian. Mashpee born and Mashpee bred, and she'll be a Mashpee until she's dead.

We have raised our children to understand

the meaning of respect. How it was the center of life for our people with the way we lived. And unfortunately, the respect that we had at the center of our lives that we showed to all who came, was not returned. And that's why the history of our nation that we live in today had to be written with the blood of our people because that respect was not returned.

Now, my obligation, first and foremost, is not only to our people who are living today. My obligation is to our ancestors whose voices were silenced so they weren't able to continue to speak and fulfill their purpose here on this earth.

So if I say anything that offends anyone, that's not my purpose, but I have to speak the truth. And if the truth offends anyone, then they have to deal with that because my first obligation is to my ancestors.

Now, ever since the first of the -- “wun-UX-a” or strangers set foot on our shores here, they have been hostile to our right to survive as native people. And what I've heard, not only tonight here, but in all the hostility that surrounds the Mashantucket people at the

reservation, all the headlines that I got. I'm tired of collecting and saving because in over three centuries, the hostility and the hatred of the native people is still very much in place. Fortunately, not with all members of this society, and that I can attest, but for many -- too many. And that's why we have the opposition to any time that our people hear the land of opportunity, quote unquote, and try to participate in that opportunity, we're not allowed to be part of that. We haven't been for over three hundred and fifty years. But that has to come to an end.

Now, I've spent my life, almost all of my adult life, my seventy-seven years on this earth, looking into the history of our people and our nation and the interaction between our people and the strangers who came here, in order to understand the lessons that history has to teach. History is a great teacher if we choose to learn those lessons. We have had two wars recently because this nation has not learned from its history. It seems to have an immunity to learn from its history.

I hope that will come to an end.

Now, my study of history has shown me that most of the communities that disappeared, and there have been a few here in Massachusetts, have disappeared because they had no economy to support the community. So an economic base is essential to maintain any community, whether it be Indian or nonIndian, in this world that we live in today.

3-18.1

That's all Mashpee is trying to do. And if you can think in those terms and try to understand that, with the respect that's so long overdue to our people, instead of trying to find multiple arguments on why they shouldn't have that opportunity to participate in the land of opportunity. You would a chance to finally have to show the respect that's so long overdue. So that then, and only then, could we begin any discussion about healing and reconciliation, which I've heard for a number of years now. Okay?

Any healing that takes place at the expense of the victims just continues the injustice of the past.

AUDIENCE MEMBER: What's his name?

TALL OAK: Now, my name is Tall Oak, (dialect) in my language. My Christian name is

Everett Weeden. I am the grandfather of Brian Weeden, my very special grandson who will take my place when I'm put into the ground finally. But he will continue my work that I don't finish because that's how he's been raised.

He has the commitment from his community that money cannot buy. And that's when a real deal is made. Not someone who has a super ego and wants the spotlight and wants to get all the attention. An Indian leader, in order to be a good leader, he has to be the one that people follow or one day you turn around and there will be no one following you. And Brian has that ability.

Now, I've heard the same arguments against having a casino here in Massachusetts, as I heard time and time again against the Mashantucket Pequot in their attempt to have land taken into trust and all, and all the arguments seem to revolve around the impact on the community. Okay? Let's talk about the impact and the changes for a minute here, and make sure that we're talking about the same thing with respect for all the parties involved. Okay?

Now, if you want to talk about the

changes to the area and quality of life that are perceived by those who oppose the casino and do not seem willing to acknowledge the much more severe changes imposed on our people, and the quality of our lives, not -- not only on our lives, but all of the greatest gifts that have been damaged and even destroyed beyond repair since the arrival of the “wun-UX-a” or the strangers here on our land. I don't need to elaborate on that. There have been countless volumes filled with those stories; we see violence on the evening news every night. So today's news is tomorrow's history.

Our people took such good care of our land that the first strangers who came here thought they had found the Garden of Eden. We did so because of respect. Respect was the center of our way of life. And respect for the greatest gifts was all through the Indian way of life. All through that fabric.

Now, what you have to remember now because history is my passion and I brought up those -- brought up these historical facts, I realize in the study of that history that nothing can change the past, but we can all learn from it

But that's only if we choose to. The opportunity is here with Mashpee now trying to exercise their God given right, not a right of the U.S. Government, the BIA or anyone else gave them. Their God given right to survive as the native people of this land. Mashpee is the largest surviving Indian community in southern New England. They have absorbed so many of the smaller communities that died out because they had no economy and so much of their land was stolen in all kinds of devious ways, okay?

I have countless volumes filled with that in my own research center at home. I have countless references that can be well documented with no problem. Anyone that knows the history of this land knows what I'm saying is true, as long as they are fair in the appraisal of that.

Now, the saddest words of mice and men are the words that might have been. I hope when you leave here tonight you won't continue to feel those words and I've been understood and that you will make the right decision guided by the Creator, as my grandson has said, because all the wisdom and all the truth comes from the Creator. And if you

follow a path that is not based on that, you're not working for your Creator, you're working for the opposition or anything else.

Thank you.

MR. McGHEE: Would anyone else like to speak?

MR. RODRIGUES: My name is Scott Rodrigues, S-C-O-T-T, R-O-D-R-I-G-U-E-S.

I haven't had a full chance to look through the entire EIS, but I just have a -- I appreciate this forum here tonight that everybody has allowed us to speak at. And if you guys would indulge me for just a moment, I do have one question that I would like to ask that doesn't seem to be being answered by -- by the appropriate people, and maybe not even asked. But I'd like to ask the Chairman of the Mashpee Wampanoag Tribe when he plans on having his land in trust application complete? And that's all I have -- and Chairman, I know, many have asked in the past, and if you'd like -- if you'd like, we can speak in the back after the meeting. I was just curious when that's going to be complete.

Thank you.

3-19.1

MR. McGHEE: Would anyone else like to speak?

MR. ROSSFELD (phonetic): My name is Michael Rossfeld. I'm a resident of Taunton and have been for thirty years.

Some things that I don't think have been touched on in a positive light. If you looked at there will be short term effects to our local businesses, but in long term, I see growth of our local businesses. Any members of Taunton that have been here that have been downtown, it is starting to be revitalized. We've seen a decline over the years of all the local businesses within the community, the Taunton Galleria was once a thriving mall is now mostly closed shops.

3-20.1 I see with the development of the resort that we will expand the businesses and fill those empty spots within the Galleria Mall, along with revitalizing downtown and other businesses that have been struggling within our community. I believe that if we get this -- the Tribe gets a land in trust, it will be doing a great service to our community and surrounding communities.

I do not have a speech prepared -- well,

I believe that if the land is given to the Tribe in trust to build this resort casino, we'll be doing a great service to the citizens of Taunton and the surrounding community along with members of the Tribe. Thank you.

MR. McGHEE: Would anyone else like to speak?

(No response)

MR. McGHEE: Would anyone like to speak again?

(No response)

MR. McGHEE: If there are no other comments, I'd like once again to thank you all for coming tonight. And we're going to close the meeting.

Thank you.

(Whereupon the Public Hearing was closed.)

C E R T I F I C A T E

COMMONWEALTH OF MASSACHUSETTS

BRISTOL, SS.

I, MAUREEN D. PIRES, a Verbatim Court Reporter and Notary Public in and for the Commonwealth of Massachusetts, do hereby certify:

That the Public Hearing for the Mashpee Wompanoag Tribe was recorded by me and transcribed by me; and that it is a true record of the proceedings, to the best of my knowledge, skill and ability.

I further certify that I am a disinterested person to the action in which this proceeding is taken.

IN WITNESS WHEREOF, I hereunto set my hand and notarial seal this 13th day of December, 2013.

Maureen D. Pires
Verbatim Court Reporter
Notary Public

My Commission Expires
July 11, 2019

ATTACHMENT 1

INTERGOVERNMENTAL AGREEMENT

By and Between

The Mashpee Wampanoag Tribe
and
The Town of Mashpee, Massachusetts

April 22, 2008

Contents

1). Intergovernmental Agreement By and Between the Mashpee Wampanoag Tribe and the Town of Mashpee, with Exhibits 'A' through 'D'.

2). Rider 'A' to Intergovernmental Agreement, with Tribal Council Resolution.

3). Town Cemetery Parcel Memorandum of Agreement, with Tribal Council Resolution.

INTERGOVERNMENTAL AGREEMENT

By and between the Mashpee Wampanoag Tribe
and
The Town of Mashpee, Massachusetts

THIS AGREEMENT ("Agreement") is made and entered into as of this 22nd day of April, 2008, by and between the Mashpee Wampanoag Tribe, a federally-recognized Indian Tribe, whose address is 483 Great Neck Road South, P.O. Box 1048, Mashpee, MA 02649 (the "Tribe") and the Town of Mashpee, a municipal corporation and political subdivision of the Commonwealth of Massachusetts, whose address is 16 Great Neck Road North, Mashpee, MA 02649 (the "Town"), collectively referred to herein as the "Parties".

WHEREAS, the Tribe is recognized by the United States, pursuant to 25 C.F.R. Part 83, and is an American Indian tribe with a written Constitution and Bylaws;

WHEREAS, the Town is a legally chartered municipality under the laws of the Commonwealth of Massachusetts;

WHEREAS, the Town will be the host community for portions of the Tribe's reservation and Tribe-related governmental, residential and commercial activities;

WHEREAS, the Tribe wishes to have the United States take title to certain lands within the Town in trust for the Tribe, as more particularly set forth in the Tribe's Petition filed with the Secretary of the Interior, dated August 30, 2007;

WHEREAS, certain of those lands are currently owned by the Town;

WHEREAS, the parties have agreed that the Town shall transfer these lands to the Tribe for the purpose of having them conveyed to the United States in trust for the Tribe and shall remove certain restrictions placed on certain lands owned by the Mashpee Wampanoag Indian Tribal Council, Inc. and shall support the taking of other lands within the Town into trust for the Tribe, subject to the terms and conditions of this agreement;

WHEREAS, the Town may lose revenue from, and planning, zoning and regulatory control over, lands located in Mashpee taken into trust by the United States on behalf of the Tribe or its members;

WHEREAS, pursuant to 25 C.F.R. Part 151 and the National Environmental Policy Act (42 U.S.C. § 4331 *et. seq.*), a decision by the Secretary of the Interior to take land into trust on behalf of the Tribe or its members considers the potential impacts on the Town, including regulatory jurisdiction, real property taxes and special assessments, removal of the land from the tax rolls, and any jurisdictional problems and potential land use conflicts and effects on the quality of the human environment arising therefrom; and

WHEREAS, the Tribe, as a sovereign Indian nation, and the Town, as a chartered municipality of the Commonwealth of Massachusetts, desire to establish a long-term, cooperative relationship between them that will serve the best interests of the Tribe and its members and the Town and its residents.

NOW THEREFORE, The Tribe and the Town, for good and valuable consideration mutually exchanged, the receipt and sufficiency of which is hereby acknowledged, hereby agree as follows:

1. **The Town agrees:**

a. To support the Tribe's acquisition in trust of the parcels of land described in Exhibit A, for the Proposed Uses identified in the Tribe's trust acquisition application dated August 30, 2007, and to undertake all reasonable measures necessary to effect the transfer of the Town's fee interest in and to those parcels identified as Parcels No. 1, 2, and 3 in Exhibit A, including sponsoring an Article(s) for approval by the Mashpee Town Meeting authorizing the transfer of said parcels and to remove certain restrictive covenants from the parcels identified as Parcels Nos. 4, 5, and 8 in said Exhibit A and to convey the Town's interest, if any, in Parcels A and B as identified on Exhibit B, subject to approval by the Mashpee Town Meeting and the execution of any necessary documents. (See Rider A, appended hereto, dated April 22, 2008.) If the Town does not have fee title to Parcels A and B as identified on Exhibit B, it shall support all necessary steps to have those Parcels acquired in trust for the Tribe including any local approvals or state legislation.

b. To support any local approvals or state legislation necessary to implement the terms of this Agreement, to the extent such approvals and/or legislation are not inconsistent with this Agreement;

c. To cooperate and work with the Tribe's staff to provide coordination between Tribe and Town actions regarding development and traffic patterns arising as a result of any proposed improvements or projects affecting land held in trust for the Tribe or tribally owned lands in Mashpee. Such coordination shall include, but is not limited to, providing the Tribe with all submissions filed with the State, Regional and Federal regulatory agencies, consulting with the Tribe on such submissions and designating a representative of the Town to be responsible for such coordination; and

d. To participate in the Tribe's capital improvement endeavors by, in the Town's discretion, assisting the Tribe in the planning and implementation of capital improvements that benefit both the Tribe and the Town;

2. **The Tribe agrees:**

a. To hereby waive and release any and all claims, rights, interests and/or entitlements relating to real property located within the geographical boundaries of the Town of Mashpee and owned by private (non-governmental) property owners or by the Town, its agencies, commissions and authorities. With the exception of those parcels described in Exhibits A and B, the Tribe shall not apply for, nor consent to, trust status for or otherwise exercise control over or limit access to any real property owned by the Town of Mashpee, including but not limited to, parklands, conservation lands, public roads, public highways, public rights-of-way, or public easements without the written consent of

the Town. Nothing herein shall be construed to waive any aboriginal rights of the Tribe to water, access to water or to hunt, fish or gather for sustenance as recognized by courts of competent jurisdiction. Furthermore, nothing herein shall prevent or preclude the Tribe and Town from engaging in negotiations or transactions subsequent to the date of this Agreement regarding the transfer of title to or interest in any Town property upon terms mutually acceptable to the Parties.

b. That after the parcels in Exhibit A and B are placed in trust for a specified use or uses, if the Tribe subsequently seeks to change or modify that use, the Tribe will notify the Town of the proposal at least sixty (60) days before the proposed change will take place, will supply the Town with any analyses of the environmental impacts of the proposed change in use that are prepared by the Tribe or its agencies, and within that sixty (60) day period will consult with the Town and consider any comments the Town submits to it concerning the proposed change. For any proposed change in use that will significantly affect the Town, the Tribe will consult directly with the Town to seek an agreement that would address Town concerns raised during the process. When federal action is required triggering the National Environmental Policy Act, the Tribe will ask to have the Town included as a cooperating agency for any environmental assessment or environmental impact statement that is required.

c. To cooperate and work with Town planning staff to promote coordination of Tribal and Town actions regarding development and traffic patterns arising as a result of any proposed improvements or projects on land held

in trust for the Tribe or tribally owned lands in Mashpee. Such coordination includes, but is not limited to, cooperating and consulting with the Town on matters involving all submissions to any State, Regional or Federal regulatory agency regarding the development of Tribal Lands in Mashpee, providing such submissions on the same date they are filed with said agencies, and designating a representative of the Tribe to be responsible for such coordination;

d. To participate in the Town's capital improvement activities by taking steps that include providing, at the Tribe's discretion, assistance for public improvement planning and funding of capital improvements that benefit both the Tribe and the Town;

e. Not to construct or operate a casino conducting either Class II or Class III gaming as authorized by the Indian Gaming Regulatory Act, 25 U.S.C. 2701, et seq., within the geographical boundaries of the Town of Mashpee; provided that the Tribe may conduct bingo and other games as permitted by state law within the geographical boundaries of the Town of Mashpee with awards or prizes not greater than those allowed by state law, including under Mass. Gen. Law, c. 10, sec. 38, as that statute may be amended in the future, upon 30 days prior notice to and consultation with the Town.

3. **Effective Date.** The terms of this Agreement shall be effective upon execution and the adoption of all approvals in Paragraphs 8a and 8b and shall remain in effect unless otherwise terminated or amended by the mutual written consent of duly authorized representatives the Tribe and the Town.

4. **Dispute Resolution**. Any claim or dispute concerning interpretation of this agreement or to determine or enforce the rights, duties or liabilities of either party under this agreement shall be resolved as follows:

a. Either party may give written notice to the other party ("notice"), which specifies: (a) the claimed violation of this agreement; (b) the corrective action which the party believes must be taken to cure the violation, and (c) a reasonable time limit within which the corrective action must be taken.

b. Either Party may initiate arbitration proceedings if it believes the violation has not been cured within the time limit specified in the notice provided pursuant to Section 4(a) as follows:

i. A party intending to demand arbitration shall first serve the other party with a written notice of that intent specifying: (a) the matters to be submitted to arbitration; (b) the nature of the relief to be sought in the arbitration; and (c) the name of the arbitrator proposed to be appointed by the party.

ii. Within 15 days after the service of such a notice of intent, the other Party shall serve a written response specifying: (a) any additional matters it intends to submit to arbitration; (b) the nature of any relief it may seek in the arbitration; and (c) the name of the arbitrator it proposes to appoint.

iii. Within 15 days after the service of the response, the parties shall confer in good faith to attempt to agree on a single arbitrator and to

resolve the matters in dispute. If they cannot agree, there shall be three arbitrators: the first arbitrator shall be the person named in the notice of intent; the second arbitrator shall be the person named in the response; and the third arbitrator shall be appointed by the first two arbitrators within 30 days after the service of the Response. The Parties further agree that no arbitrator shall be a member or employee of the Tribe or the Town. If either party fails to appoint an arbitrator or fails to appoint a successor arbitrator within 10 days after the incapacity or resignation of its previously appointed arbitrator, or if the first and second arbitrators fail to appoint a third arbitrator within 30 days after the service of the response, or fail to appoint a successor third arbitrator within 20 days after the incapacity or resignation of the previously appointed third arbitrator, then the arbitrator shall be selected by the Regional Vice-President of the American Arbitration Association for Massachusetts.

iv. All hearings and other proceedings in the arbitration shall be held at Mashpee, Massachusetts, unless otherwise agreed by the Parties. Meetings of the arbitrator or arbitrators may be in person or, in appropriate circumstances, by telephone. All decisions of the arbitrator or the arbitration panel shall be by majority vote, shall be in writing and, together with any dissenting opinions, shall be delivered to both Parties. The arbitrator or arbitration panel shall have power to administer oaths to witnesses, to take evidence under oath, and, by majority vote, to issue subpoenas to compel the attendance of employees and members of the Tribe or employees of the Town or for the production of

books, records, documents and other relevant evidence by either Party. The arbitrator or arbitration panel shall hold hearings in all proceedings, and shall give reasonable advance notice to both Parties by registered mail not less than five working days before any hearing. Appearance at a hearing waives such notice. The arbitrator or arbitration panel may hear and determine the controversy only upon evidence produced before it and may determine the controversy notwithstanding the failure of either Party duly notified to appear. The Parties are each entitled to be heard at all hearings, to present evidence material to the matter subject to arbitration, to cross-examine witnesses appearing at the hearing, and to be represented by counsel at their own expense. A transcript shall be kept of all proceedings before the arbitrator or arbitration panel. Except as necessary for the enforcement or judicial review of the arbitration decision, the parties and arbitrator or arbitration panel shall maintain the confidentiality of all such transcripts.

v. With respect to the matters submitted, the arbitrators shall have authority to:

I. issue appropriate interlocutory orders to mitigate damage or prevent irreparable injury to a Party;

II. render a final decision which:

(A) determines or declares the rights, duties, adequacy of performance, or breach of a Party under the agreement; and

(B) awards appropriate injunctive or declaratory relief for the benefit of either Party.

vi. The decision of the arbitrator or arbitration panel shall be conclusive and binding on the parties with respect to the matters decided, and shall be complied with by the parties. A party may enter the judgment of the arbitrators and institute proceedings to enforce the decision in the Superior Court for Barnstable County, which the parties agree shall enforce the judgment to the fullest extent permitted by law. In such judicial proceedings, each party shall bear the costs and expenses for the presentation of its case, including fees of its attorneys.

vii All costs of arbitration, including the fees and expenses of the arbitrators, shall be borne equally by the parties, provided that each party shall bear the costs and expenses for the presentation of its case, including the fees of its attorneys.

5. **Waivers of Immunity.**

a. The Town recognizes that the Tribe is a sovereign Indian nation exempt from suit except to the extent the Tribe or Congress waives such immunity. The Tribe recognizes that the Town is a sovereign entity to the extent provided by the Mashpee Home Rule Charter, Massachusetts Constitution, and Massachusetts General Law.

b. The Tribe and Town hereby each expressly waive their respective sovereign immunity to the limited extent necessary to permit arbitration

and judicial review and enforcement of an arbitration decision by the Superior Court for Barnstable County, and shall not raise sovereign immunity as a defense to such proceedings, with respect to the following relief only:

i. declarations of the parties' rights, duties, adequacy of performance or breach of or under the Agreement;

ii. interlocutory or final orders directing either party to specifically perform its obligations under the Agreement;

iii. orders compelling a party to participate in arbitration commenced or enforcing an arbitration Decision or Judgment.

iv. neither party shall be liable for money damages, attorneys fees of the other party, or any costs whatever (other than its share of the costs of arbitration).

c. The Tribe shall not assert the Town's failure to exhaust tribal court remedies as a defense to any arbitration or judicial proceeding authorized in this agreement.

6. **Governing Law.** This Agreement shall be governed by the laws of the United States of America, and where such laws are nonexistent or inapplicable, by the laws of the Commonwealth of Massachusetts. The parties agree that any adoption or utilization of Massachusetts State law is for purposes of contract construction only and is not intended to authorize, sanction, or endorse the application of the laws of the State of Massachusetts for any other purposes,

including consent to regulatory authority of the State or any political subdivision of the State.

7. **Survival.** The terms and conditions contained in Sections 4 and 5 shall survive any termination of this Agreement.

8. **Authorization.** The Tribe and the Town represent and warrant that each of the signatories hereto has the full power and authority to execute this Agreement and perform the obligations of the respective Parties in accordance with the terms and condition hereof, and that the representatives executing this Agreement on behalf of such Party have been duly and fully authorized to so execute and deliver this Agreement.

a. The Tribe has authorized its officers to execute this Agreement by the adoption of Resolution No. 2008-RES-004 , dated February 20, 2008, a copy of which is attached hereto as Exhibit C.

b. The Mashpee Town Meeting has authorized the Board of Selectmen to execute this Agreement by its vote under Article 1 of the Town Meeting held on April 7, 2008, a certified copy of which is attached hereto as Exhibit D.

9. **Recording the Agreement.** The Tribe agrees that it will take all steps necessary to ensure that title to any lands acquired from the Town pursuant to this Agreement, when accepted into trust by the Secretary of the Interior, for and on behalf of the United States, shall be subject to this Agreement and all applicable Federal law, and that the terms of this Agreement shall be recorded

with the Barnstable County Registry of Deeds, and that the Tribe as the owner of beneficial title to those lands, shall enjoy and be subject to all rights, privileges and obligations of this Agreement.

10. **Best Efforts**. The parties agree that they shall devote their best efforts to the fulfillment of their respective duties and obligations hereunder in accordance with the provisions of this Agreement.

11. **Successors and Assigns; Assignment; Parties in Interest.** The benefits and obligations of this Agreement shall inure to and be binding upon the Parties hereto, their respective successors and assigns; provided, however, that no Party may assign its interest or obligations hereunder, nor delegate its duties or obligations hereunder, without the prior written approval of the other Party, and without such other approvals as may be required by law. Nothing in this Agreement, express or implied, is intended or shall be construed to give to any person other than the Parties hereto any right, remedy or claim under or by reason of this Agreement.

12. **Severability**. In the event that any portion of this Agreement is determined to be null, void or unenforceable by any court of competent jurisdiction, then the remaining provisions of this Agreement shall remain in full force and effect unless such result would defeat the general purposes and goals of this Agreement.

13. **Entire Agreement.** This Agreement embodies the entire understanding and agreement between the Parties and specifically supersedes all

prior agreements and understandings relating hereto. The Parties acknowledge that they are not relying upon any representations, warranties, conditions, agreements or understandings, except as specified herein.

14. **Amendments.** This Agreement may be amended only by written agreement of the Parties hereto.

EXECUTED as a sealed instrument on the date first mentioned above.

Town of Mashpee
By its Board of Selectmen

Chairman

Mashpee Wampanoag Tribe
By:

Its:

EXHIBIT A
LANDS TO BE TAKEN INTO TRUST IN MASHPEE

PARCEL	SIZE	CURRENT OWNER	CURRENT USE	PROPOSED USE	ZONE
1 Map 61, Block 58A	6,447 square feet, plus or minus (approximately 0.15 acres)	Town of Mashpee	Old Indian Meeting House	Old Indian Meeting House	R-3 Residential
2 Map 68, Block 13A	11.75 acres	Town of Mashpee	Town Cemetery	Continued cemetery preservation, upkeep and burial for families who have cemetery plots	R-3 Residential
3 Map 27, Block 42	2 and ½ acres, more or less (Assessors' map 2.0 acres)	The Parish of Mashpee	the Parsonage	Historical, cultural and religious uses	R-5 Residential
4 Map 35, Block 30	½ acre, more or less (Assessors' map 0.584 acres)	Mashpee Wampanoag Indian Tribal Council, Inc.	Tribe's Museum	Conveyance conditioned on use for educational, recreational and cultural services	R-5 Residential, Mashpee Center Overlay District
5 Map 95, Block 7 +	Approximately 55 acres (Assessors' map 58.7 acres)	Mashpee Wampanoag Indian Tribal Council, Inc.	Tribal Council offices	Tribal Council Office, Administration and cultural and religious uses	R-3 Residential
6 Map 45, Block 73A	10.81 acres, more or less	Mashpee Wampanoag Indian Tribal Council, Inc.	Vacant land	Tribal housing	R-5 Residential
7 Map 45, Block 75	46.82 acres	Old Indian Meeting House, Inc.	Vacant land	Tribal housing	R-5 Residential
8 Map 125, Block 238	(Assessors' map 0.361 acres)	Mashpee Wampanoag Indian Tribal Council, Inc.	Conservation land (burial ground)	Conservation land	R-3 Residential
9 Map 99, Block 38	Approximately 8.9 acres	Mashpee Wampanoag Tribe	Conservation land	Conservation land	R-3 Residential

EXHIBIT B

PARCEL	SIZE	CURRENT OWNER	CURRENT USE	PROPOSED USE	ZONE
A Map 106	4.6 acres Punkhorn Point Site See Map attached.		Aquaculture/ Wampanoag Shellfish Farm	Aquaculture/ Wampanoag Shellfish Farm	
B Map 106	8 acres Popponesset Bay Site See Map attached.		Aquaculture/ Wampanoag Shellfish Farm	Aquaculture/ Wampanoag Shellfish Farm	

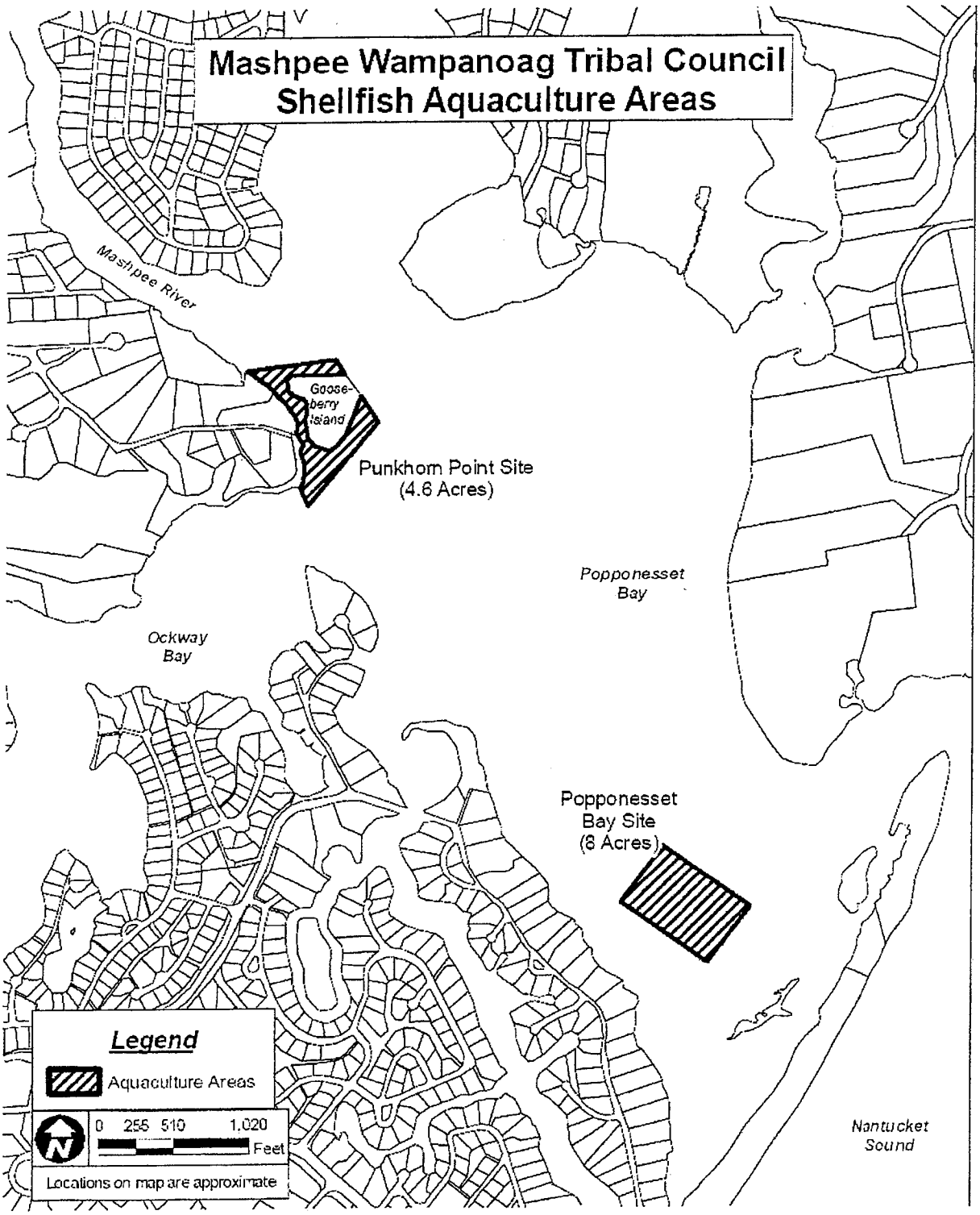
Mashpee Wampanoag Tribal Council
Shellfish Aquaculture Areas
Mashpee River
Goose-
berry
Island
Punkhorn Point Site
(4.6 Acres)
Popponesset
Bay
Ockway
Bay
Popponesset
Bay Site
(8 Acres)
Nantucket
Sound
Legend
Aquaculture Areas
0 255 510 1,020
Feet
Locations on map are approximate

EXHIBIT C

TRIBAL RESOLUTION

Mashpee Wampanoag Tribe
483 Great Neck Rd. P.O. Box 1048 Mashpee, MA 02649
Phone (508) 477-0208 Fax (508) 477-1218

2008-RES-004

APPROVING AN INTERGOVERNMENTAL AGREEMENT (IGA) WITH THE TOWN OF MASHPEE

WHEREAS, the Mashpee Wampanoag Tribe has filed with the Department of Interior (DOI) an application for Land Into Trust which includes nine parcels in the Town of Mashpee; and

WHEREAS, the Town of Mashpee has agreed subject to a Special Town Meeting vote to convey four parcels of land to the Tribe and to remove certain restrictions to three other parcels which are owned by the Mashpee Wampanoag Indian Tribal Council; and

WHEREAS, the Town and the Tribe have agreed upon a proposed Intergovernmental Agreement (IGA) which provides for the conveyance of the aforementioned lots and the termination of restrictions on the aforementioned lots; and

WHEREAS, the Tribe has agreed upon execution of the IGA by the Town not to conduct gaming authorized under the Indian Gaming Regulatory Act (IGRA) in the Town of Mashpee; and

WHEREAS, the Tribe has agreed upon execution of the IGA by the Town not to file a land claim suit on behalf of the Tribe for privately owned lands and for Town owned lands; and

WHEREAS, the Town has agreed subject to a Special Town Meeting vote to support the Tribe's application with DOI; and

WHEREAS, the Town has agreed subject to a Special Town Meeting vote to withdraw its notification to DOI of its opposition to the Tribe's application for Land into Trust; and

WHEREAS, the Tribe has by a vote of its general membership approved the proposed IGA at a vote taken on Sunday, February 10, 2008 at which 132 enrolled Tribe members voted to advise the Tribal Council to enter into the IGA and 77 enrolled members of the Tribe voted not to advise the Tribal Council to enter into said agreement; and

WHEREAS, the Selectmen of the Town of Mashpee have voted to send articles to a Special Town Meeting accomplishing the promises and agreements exchanged herein; and

WHEREAS, the Special Town Meeting is to be conducted on April 7, 2008 at which a two-thirds majority of registered voters of the Town voting at the Special Town Meeting must approve the IGA; and

WHEREAS, the Selectmen of the Town of Mashpee will pursuant to that vote execute the IGA, an executed copy of which is attached hereto and signed by the Chairman and to be counter signed by the Town of Mashpee Board of Selectmen pursuant to the vote taken at the Special Town Meeting.

THEREFORE, BE IT RESOLVED, that the Mashpee Wampanoag Tribal Council at a regular meeting held on Wednesday, February 20, 2008 at which a quorum was present voted to authorize the signing and execution of this agreement by its Chairman, Shawn Hendricks.

Shawn W. Hendricks, Sr., Chairman

TRUE COPY ATTEST, February 20, 2008

Desire Hendricks Moreno, Secretary
Mashpee Wampanoag Tribe

Mashpee Wampanoag Tribe
483 Great Neck Rd. P.O. Box 1048 Mashpee, MA 02649
Phone (508) 477-0208 Fax (508) 477-1218

Tribal Council Members

yes
Shawn W. Hendricks, Sr., Chairman

David Pocknett SR YES
David Pocknett, Sr., Vice Chairman

yes
Desire Hendricks-Moreno, Secretary

Nellie Ramos, Treasurer

Vernon Lopez, Chief

Guy Cash, Medicine Man

yes
Richard Oakley, Council Member

Martin Hendricks, Council Member

NO
Aaron Tobey, Council Member

yes
Yvonne Avant, Council Member

Abstained
Cheryl Cromwell, Council Member

yes
Robert Dias, Council Member

Abstained
Cedric Cromwell, Council Member

EXHIBIT D

TOWN MEETING VOTE

Town of Mashpee
Special Town Meeting
April 7, 2008

Town Meeting convened at 7:02 pm
Quorum 100
Voters 338

Article 1

To see if the Town will vote to authorize the Board of Selectmen to enter into an Inter-Governmental Agreement with the Mashpee Wampanoag Tribe of Massachusetts, a federally recognized Indian tribe, upon such terms and conditions as the Selectmen deem advisable and in the best interest of the Town, or take any other action relating thereto.

Submitted by the Board of Selectmen

Explanation: This Article seeks the authorization of the Town Meeting for execution of an Inter-Governmental Agreement with the Mashpee Wampanoag Tribe of Massachusetts ("Tribe"). Upon the final approval by the United States Department of the Interior of its petition for acknowledgment, the Tribe obtained the status of sovereign governmental entity pursuant to and in accordance with the terms of applicable Federal law. Acknowledged Indian Tribes frequently enter into Inter-governmental agreements with municipalities, counties and/or states within which they acquire property in trust for reservation and other tribal purposes which specify terms and conditions for the disposition of real estate interests and claims, and address inter-governmental relationships between the Tribe and other sovereign governmental entities. Representatives of the Tribe and Town have been engaged in discussions and negotiations for nearly two years relative to the disposition of interests in certain real property located within the Town of Mashpee, the disposition of potential claims or actions relative to certain Town owned and private owned land located within Mashpee, the intentions of the Tribe to conduct gaming activities within the Town, and other land use and regulation issues. The proposed Inter-governmental Agreement issued for public review in February 2008 has been negotiated and endorsed by the Board of Selectmen and Mashpee Wampanoag Tribal Council as the Chief Executive Boards of the Town and Tribe, respectively. This Article seeks authorization of Town Meeting for execution of the proposed Agreement by the Board of Selectmen.

The Board of Selectmen recommends approval by a vote of 5-0.

The Finance Committee recommends approval by a vote of 5 in favor; one abstention; one absent.

Motion made by Selectman Theresa Cook.

Motion: I move that the Town vote to authorize the Board of Selectmen to enter into an Inter-Governmental Agreement with the Mashpee Wampanoag Tribe upon such terms and conditions as the Selectmen deem advisable and in the best interest of the Town.

Majority Vote needed to pass *(per G.L. c.40, s.4).*

Motion passes by majority call by the Town Moderator at 7:18 PM.

A TRUE COPY, ATTEST
Deborah J. D...
TOWN CLERK OF MASHPEE, MA

Town of Mashpee
Special Town Meeting
April 7, 2008

Town Meeting convened at 7:02 pm
Quorum 100
Voters 338

Article 2

To see if the Town will vote to authorize the Board of Selectmen to convey, grant and/or release to the Mashpee Wampanoag Tribe of Massachusetts (the "Tribe") the Town's title, rights, or interest in and to the following described parcels of real property, to file such petitions with the Massachusetts General Court as may be necessary to effect this conveyance, grant or release, and to execute any and all instruments necessary to convey, grant and /or release the Town's title, interest or rights, upon such terms and conditions as the Board of Selectmen shall deem to be in the interest of the Town; provided, that the Town and the Tribe shall have first executed an Inter-Governmental Agreement specifically providing the terms of disposition of the subject title, rights and/or interests:

Parcel One: The parcel of real estate, containing 6,447 sq. ft., more or less, together with any improvements thereon, identified on Mashpee Assessors Map 61 as Block 58A, and commonly known as the Old Indian Meeting House parcel;

Parcel Two: The parcel of land containing approximately 6.02 acres to 11.75 acres, identified on Mashpee Assessors Map 68 as Block 13A, currently utilized as a Town Cemetery;

Parcel Three: The parcel of land containing approximately 2 1/2 acres, more or less identified on Mashpee Assessors Map 27 as Block 42, together with any improvements thereon, and commonly known as the Parsonage Parcel;

Parcel Four: The parcel of land containing 1/2 acre, more or less, identified on Mashpee Assessors Map 35 as Block 30, currently owned by the Mashpee Wampanoag Indian Tribal Council, Inc. and commonly referenced as the Indian Museum Parcel;

Parcel Five: The parcel containing approximately 58.7 acres, more or less, identified on Mashpee Assessors Map 95 as Block 7, currently owned by the Mashpee Wampanoag Indian Tribal Council, Inc. and used for Tribal Council office, administration, cultural and religious uses;

Parcel Six: The parcel containing approximately .361 acre, more or less, identified on Mashpee Assessors Map 125 as Block 238, currently owned by the Mashpee Wampanoag Indian Tribal Council, Inc. and used for conservation/burial ground purposes;

Parcel Seven: The parcel containing 4.6 acres, more or less, identified on Assessors Map 106, located off of Punkhorn Point and Gooseberry Island, currently utilized as a Wampanoag Aquaculture/Shellfish Farm site;

Parcel Eight: The parcel containing 8 acres, more or less, identified on Assessors Map 106, located in Popponesset Bay, currently utilized as a Wampanoag Aquaculture/Shellfish Farm site;

or take any other action relating thereto.

Submitted by the Board of Selectmen

Explanation: This Article seeks the authorization of Town Meeting for the conveyance and/or release of the Town's title, rights or interest in and to the eight parcels of real property identified in Paragraph 1(a) and Exhibits A and B of the Intergovernmental Agreement. As stated in the Agreement, upon conveyance of the Town's right, title and interest in the parcels identified as Parcels One through Six, the Tribe will pursue the pending petition to the United States Department of the Interior, Bureau of Indian Affairs ("BIA") for acceptance of said parcels into trust for the benefit of the Tribe, pursuant to Section 5 of the Indian Reorganization Act of 1934, *25 U.S.C. section 465*. All of these parcels have already been identified by the Tribe as prospective trust parcels in the Tribe's August 30, 2007 Application to the BIA which seeks trust designation for multiple parcels of land in Mashpee and Middleborough. Upon authorization of the subject conveyance/release of rights by Town Meeting, the Selectmen will, in consideration of and subject to the terms of the Intergovernmental Agreement, execute all instruments necessary to convey the Town's rights, title and interest in the subject parcels, and they will withdraw the Town's previously filed comments objecting to the Tribe's pending BIA land into trust Application. Parcels Seven and Eight are Wampanoag Shellfish Farms located in Popponesset Bay which, have, for several years been cultivated, maintained and harvested by the Tribe pursuant to licenses and permits granted

by the Town. The Town has agreed in the Intergovernmental Agreement to convey to the Tribe any right, title or interest of the Town in these two parcels for continued aquaculture/ shellfish farm use and/or to support steps necessary for these parcels to be taken into trust for this purpose. Any conveyance of Town owned land, or any interest therein, must be authorized by a 2/3 vote of the Town Meeting.

The Board of Selectmen recommends approval by a vote of 5-0.

The Finance Committee recommends approval by a vote of 5 in favor; one abstention; one absent.

Motion made by Selectman Theresa Cook.

Motion: I move that the Town vote to transfer the use of the following parcels of property to the status of land held for disposition, and to authorize the Board of Selectmen to convey, grant and/or release to the Mashpee Wampanoag Tribe, upon such terms and conditions as the Selectmen deem to be in the best interest of the Town, the Town's title, right or interest in and to the following parcels of land:

Parcel One: The fee interest of the Town in the parcel of real estate, containing 6,447 sq. ft., more or less, together with any improvements located thereon, identified on Mashpee Assessors Map 61 as Block 58A, and commonly known as the Old Indian Meeting House parcel;

Parcel Two: The fee interest of the Town in the parcel of land containing approximately 11.75 acres, identified on Mashpee Assessors Map 68 as Block 13A, currently utilized as a Town Cemetery;

Parcel Three: The fee interest of the Town in the parcel of land containing approximately 2.5 acres, more or less identified on Mashpee Assessors Map 27 as Block 42, together with any improvements located thereon, and commonly known as the Parsonage Parcel;

Parcel Four: The restrictions and/or reverter rights encumbering the parcel of land containing .50 acre, more or less, identified on Mashpee Assessors Map 35 as Block 30, currently owned by the Mashpee Wampanoag Indian Tribal Council, Inc. and commonly known as the Indian Museum Parcel;

Parcel Five: The restrictions and/or reverter rights encumbering the parcel containing approximately 58.7 acres, more or less, identified on Mashpee Assessors Map 95 as Block 7, currently owned by the Mashpee Wampanoag Indian Tribal Council, Inc. and used for Tribal Council office, administration, cultural and religious uses; and

Parcel Six: The restrictions and/or reverter rights encumbering the parcel containing approximately .361 acre, more or less, identified on Mashpee Assessors Map 125 as Block 238, currently owned by the Mashpee Wampanoag Indian Tribal Council, Inc. and used for conservation/burial ground purposes;

And to authorize the Board of Selectmen to execute and record any agreements, instruments or deeds necessary to effect such conveyances, grants and/or releases; and, further, to authorize the Board of Selectmen to petition the Massachusetts General Court for such legislation as may be necessary to effect any such conveyance, grant or release; provided, that the Town and Tribe shall have first executed an Inter-Governmental Agreement or Agreements specifying the terms of disposition of the Town's title, rights and/or interests in the subject real property.

Two-Thirds Vote needed *(per G.L. c.40, s.15 and 15A).*

Motion passes by a rule of 2/3rds vote called by the moderator at 7:25 PM.

A TRUE COPY, ATTEST

Deborah J. D.

TOWN CLERK OF MASHPEE, MA

RIDER A

April 22, 2008

The Town and Tribe hereby acknowledge that this Intergovernmental Agreement ("Agreement"), at some future time within the scope of the proceedings relating to the Tribe's pending Petition to the Department of the Interior ("Department") to take into trust title to the parcels of real property identified in Exhibit A, may be subject to approval by the Department under the provisions of 25 U.S.C. s.81 ("Section 81"). The parties hereby acknowledge that, to the extent such approval is determined by the Department to be a prerequisite to the validity and/or enforceability of this Agreement as it pertains to Indian lands, notwithstanding the fact that this Agreement is entered into prior to any Indian land designation, such Section 81 approval is a material term of the Agreement for purposes of the Town's duty to convey its title and interest in and to the parcels itemized in Exhibit A. The Tribe's consideration for this Agreement contains two provisions, the first of which is a promise to refrain from conducting gaming under the Indian Gaming Regulatory Act ("IGRA") in the Town and the second is a promise to waive and release any and all claims of right, title or interest in any privately or publicly owned lands in the Town. The Town and Tribe hereby expressly acknowledge that these provisions are, and shall in the future be, mutually binding on the Tribe and Town and are enforceable as a contract

pursuant to the laws of the Commonwealth of Massachusetts, regardless of whether or when Section 81 approval is obtained.

As of the date of this Rider, the Town has exercised diligent efforts to obtain the Department's approval of this Agreement under Section 81 or, alternatively, the Department's written determination that Section 81 does not apply to the Agreement. The Department has declined to make either of these determinations at this time and has indicated that it will not provide approval under Section 81 until such time as the decision to place the land into trust is made.

Accordingly, The Town and Tribe hereby agree, as a condition to the Town's agreement to effect the transfer all of its right, title and interest in the real property identified as Parcels 1, 2, 3, 4, 5 and 8 in Exhibit A as follows:

> In the event that the Department shall notify the Tribe that it does not approve the Agreement under Section 81 the Tribe and the Town hereby agree to negotiate in good faith to amend the agreement in an effort to secure approval under Section 81.

Executed on this 22nd day of April, 2008 as Rider A to the Intergovernmental Agreement appended hereto by the duly authorized representatives/agents of the Town of Mashpee and Mashpee Wampanoag Tribe.

Town of Mashpee
By its Board of Selectmen

Chairman

Mashpee Wampanoag Tribe
By:

Its:

MASHPEE WAMPANOAG TRIBAL COUNCIL

RESOLUTION NO. 10

AUTHORIZING AND REAUTHORIZING THE CHAIRMAN TO EXECUTE AND DELIVER THE INTERGOVERNMENTAL AGREEMENT (IGA), RIDER A TO THE IGA, AND THE TOWN CEMETERY PARCEL MEMORANDUM OF AGREEMENT TO THE TOWN OF MASHPEE.

WHEREAS, the Tribal Council on February 20, 2008, voted to authorize the Chairman to execute and deliver the Intergovernmental Agreement to the Town of Mashpee; and

WHEREAS, on April 2, 2008, the Tribal Council authorized the Chairman to execute the Cemetery Parcel Memorandum of Agreement with the Town of Mashpee; and

WHEREAS, on April 7, 2008, the citizens of the Town of Mashpee voted at a Special Town Meeting to approve the execution by the Town of the Intergovernmental Agreement; and

WHEREAS, the citizens of the Town of Mashpee also voted to approve the conveyance of the Cemetery parcel, the Meeting House, and the Parsonage to the Tribe; and

WHEREAS, the Town of Mashpee also voted support the Tribe's application for placing nine parcels of land into trust and to remove certain restrictions on three of those nine parcels; and

WHEREAS, the Tribe approves the terms of said Rider A attached to this Resolution to the IGA which provides that "In the event that the Department shall notify the Tribe that it does not approve the Agreement under Section 81, the Tribe and the Town hereby agree should negotiate in good faith to amend the Agreement in an effort to secure approval under Section 81" from the Department; and

THEREFORE, BE IT RESOLVED, that the Mashpee Wampanoag Tribal Council at a regular meeting held on Wednesday, April 16, 2008 at which a quorum was present voted to authorize the signing and execution of these documents by its Chairman, Shawn W. Hendricks, Sr.

_____

Shawn W. Hendricks, Sr., Chairman

TRUE COPY ATTEST, April 16, 2008

_____

Desire Hendricks Moreno, Secretary
Mashpee Wampanoag Tribe

Mashpee Wampanoag Tribe

MASHPEE WAMPANOAG TRIBAL COUNCIL

RESOLUTION NO. 2008-RES-010

AUTHORIZING AND REAUTHORIZING THE CHAIRMAN TO EXECUTE AND DELIVER THE INTERGOVERNMENTAL AGREEMENT (IGA), RIDER A TO THE IGA, AND THE TOWN CEMETERY PARCEL MEMORANDUM OF AGREEMENT TO THE TOWN OF MASHPEE.

WHEREAS, the Tribal Council on February 20, 2008, voted to authorize the Chairman to execute and deliver the Intergovernmental Agreement to the Town of Mashpee; and

WHEREAS, on April 2, 2008, the Tribal Council authorized the Chairman to execute the Cemetery Parcel Memorandum of Agreement with the Town of Mashpee; and

WHEREAS, on April 7, 2008, the citizens of the Town of Mashpee voted at a Special Town Meeting to approve the execution by the Town of the Intergovernmental Agreement; and

WHEREAS, the citizens of the Town of Mashpee also voted to approve the conveyance of the Cemetery parcel, the Meeting House, and the Parsonage to the Tribe; and

WHEREAS, the Town of Mashpee also voted support the Tribe's application for placing nine parcels of land into trust and to remove certain restrictions on three of those nine parcels; and

WHEREAS, the Tribe approves the terms of said Rider A attached to this Resolution to the IGA which provides that "In the event that the Department shall notify the Tribe that it does not approve the Agreement under Section 81, the Tribe and the Town hereby agree should negotiate in good faith to amend the Agreement in an effort to secure approval under Section 81" from the Department; and

THEREFORE, BE IT RESOLVED, that the Mashpee Wampanoag Tribal Council at a regular meeting held on Wednesday, April 16, 2008 at which a quorum was present voted to authorize the signing and execution of these documents by its Chairman, Shawn W. Hendricks, Sr.

Shawn W. Hendricks, Sr., Chairman

TRUE COPY ATTEST, April 16, 2008

Desire Hendricks Moreno, Secretary
Mashpee Wampanoag Tribe

483 Great Neck Road, South P.O. Box 1048, Mashpee, MA 02649 (508) 477-0208 (508) 477-1218 fax

RIDER A

April 16, 2008

The Town and Tribe hereby acknowledge that this Intergovernmental Agreement ("Agreement"), at some future time within the scope of the proceedings relating to the Tribe's pending Petition to the Department of the Interior ("Department") to take into trust title to the parcels of real property identified in Exhibit A, may be subject to approval by the Department under the provisions of 25 U.S.C. s.81 ("Section 81"). The parties hereby acknowledge that, to the extent such approval is determined by the Department to be a prerequisite to the validity and/or enforceability of this Agreement as it pertains to Indian lands, notwithstanding the fact that this Agreement is entered into prior to any Indian land designation, such Section 81 approval is a material term of the Agreement for purposes of the Town's duty to convey its title and interest in and to the parcels itemized in Exhibit A. The Tribe's consideration for this Agreement contains two provisions, the first of which is a promise to refrain from conducting gaming under the Indian Gaming Regulatory Act ("IGRA") in the Town and the second is a promise to waive and release any and all claims of right, title or interest in any privately or publicly owned lands in the Town. The Town and Tribe hereby expressly acknowledge that these provisions are, and shall in the future be, mutually binding on the Tribe and Town and are enforceable as a contract pursuant to the laws of the Commonwealth of Massachusetts, regardless of whether or when Section 81 approval is obtained.

As of the date of this Rider, the Town has exercised diligent efforts to obtain the Department's approval of this Agreement under Section 81 or, alternatively, the Department's written determination that Section 81 does not apply to the Agreement. The Department has declined to make either of these determinations at this time and has indicated that it will not provide approval under Section 81 until such time as the decision to place the land into trust is made.

Accordingly, The Town and Tribe hereby agree, as a condition to the Town's agreement to effect the transfer all of its right, title and interest in the real property identified as Parcels 1, 2, 3, 4, 5 and 8 in Exhibit A as follows:

> In the event that the Department shall notify the Tribe that it does not approve the Agreement under Section 81 the Tribe and the Town hereby agree to negotiate in good faith to amend the agreement in an effort to secure approval under Section 81.

Executed on this 16 day of April, 2008 as Rider A to the Intergovernmental Agreement appended hereto by the duly authorized representatives/agents of the Town of Mashpee and Mashpee Wampanoag Tribe.

Town of Mashpee
By its Board of Selectmen

_____

Chairman

_____

_____

_____

_____

Mashpee Wampanoag Tribe
By: [signature]

Its: Chairman

TOWN CEMETERY PARCEL
MEMORANDUM OF AGREEMENT

This Memorandum of Agreement is entered into as of this 22nd day of April 2008, by and between the Mashpee Wampanoag Tribe, a federally recognized Indian Tribe, whose address is 483 Great Neck Road South, P.O. Box 1048, Mashpee, MA 02649 (the "Tribe") and the Town of Mashpee, a municipal corporation and political subdivision of the Commonwealth of Massachusetts, whose address is 16 Great Neck Road North, Mashpee, MA 02649 (the "Town"), collectively referred to herein as the "Parties".

WHEREAS, the Tribe and the Town have negotiated an Intergovernmental Agreement, whereby the Parties have agreed to certain terms and conditions relative to the intergovernmental relationship between the Tribe, as a federally recognized American Indian Tribe pursuant to 25 C.F.P.R. Part 83, and the Town as a municipal corporation and political subdivision of the Commonwealth of Massachusetts;

WHEREAS, said Intergovernmental Agreement has been approved by the Mashpee Wampanoag Tribal Council pursuant to Tribal Resolution Number 2008-RES-004, dated February 20, 2008, and by the vote of the Town of Mashpee under Article 1 of the Mashpee Special Town Meeting on April 7, 2008;

WHEREAS, pursuant to the terms of the Intergovernmental Agreement, the Town has agreed to convey to the Tribe all right, title and interest of the Town in and to nine (9) parcels of real property located in the Town of Mashpee, as identified in Exhibit A to the Intergovernmental Agreement;

EXHIBIT A

PARCEL 1

The land with the building thereon situated in the Town of Mashpee as shown on a plan of land prepared for the Old Indian Meeting House Authority, Inc. in Mashpee, Mass dated March 29, 2007 and prepared by Mary Ellen Streeter, Registered Professional Land Surveyor of Holmes and McGrath, Inc. which land contains the Old Indian Meeting House bounded and described as follows:

WESTERLY by Meeting House Road 70.03 (seventy and three hundredth) feet.

SOUTHERLY by land now or formerly of the Town of Mashpee 86.92 (eighty-six and ninety-two hundredth) feet.

EASTERLY by land now or formerly of the Town of Mashpee 70 (seventy) feet.

NORTHERLY by land now or formerly of the Town of Mashpee 98.78 (ninety-eight and seventy-eight hundredth) feet.

This parcel contains 6,447 plus or minus square feet and is identified by the Town of Mashpee as Parcel 58A. Title reference Barnstable Registry of Deeds, Book 121, Page 139.

PAISS

14:45:19
mashpee commemts-012808-035649PM.pdf

ATTACHMENT 2

Perkins Coie

607 Fourteenth Street N.W.
Washington, D.C. 20005-2011
PHONE: 202.628.6600
FAX: 202.434.1690
www.perkinscoie.com

Donald C. Baur
PHONE: (202) 434-1621
FAX: (202) 654-9665
EMAIL: DBaur@perkinscoie.com

January 25, 2008

Franklin Keel, Director
Bureau of Indian Affairs
Eastern Regional Office
545 Marriot Drive, Suite 700
Nashville, TN 37214

Re: Comments on the Proposed Trust Acquisition of the Mashpee Wampanoag Tribe of Massachusetts

Dear Director Keel:

Please find enclosed the comments of the Town of Mashpee regarding the proposed trust acquisition of land by the Mashpee Wampanoag Tribe of Massachusetts. The Town is providing these comments in response to the Bureau of Indian Affairs' notice and request for information, dated October 29, 2007.

Should you have any questions regarding these comments, please contact Donald Baur (contact information above) or Patrick Costello at (617) 439-0305, Louison, Costello, Condon, & Pfaff, LLP, 67 Batterymarch Street, Boston, Massachusetts 02110.

Very truly yours,

Donald C. Baur

Patrick J. Costello

cc: Town of Mashpee, Board of Selectmen

COMMENTS OF THE TOWN OF MASHPEE ON THE TRUST LAND ACQUISITION REQUEST OF THE MASHPEE WAMPANOAG TRIBE OF MASSACHUSETTS

Submitted to

Bureau of Indian Affairs
Eastern Regional Office
545 Marriott Drive, Suite 700
Nashville, TN 37214

January 25, 2008

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I. INTRODUCTION

The Town of Mashpee, Massachusetts (Town) submits these comments in response to the notice from the Bureau of Indian Affairs (BIA) requesting information about the application of the Mashpee Wampanoag Tribe of Massachusetts (Tribe) to have certain land acquired in trust pursuant to sections 5 and 7 of the Indian Reorganization Act of 1934 (IRA), 25 U.S.C. §§ 465 and 467, and federal trust land acquisition regulations, 25 C.F.R. Part 151. The application involves land in Mashpee and Middleborough, Massachusetts. The land the Tribe seeks to have acquired within the Town consists of nine separate parcels, totaling approximately 141 acres (Mashpee lands). The proposed Middleborough request involves 539 acres of land.

The Town opposes the proposed transfer of land into trust for several reasons. First, the Tribe's request fails to clarify that a determination that the land qualifies for gaming as an initial reservation under 25 U.S.C. § 2719(b)(1)(B)(ii) of the Indian Gaming Regulatory Act (IGRA), as requested by the Tribe on page 2 of its request, only applies to the Middleborough land. Compliance with section 20 is required before land can be acquired in trust and used for gaming purposes. Although the Tribe states in its application that the Mashpee lands are "not suitable" for gaming purposes, the Tribe has not requested that the section 20 initial reservation determination be limited to Middleborough lands. Instead, the Tribe appears to request that land in both locations be acquired in trust for gaming purposes in accordance with section 20. The Town must oppose designation of the Mashpee lands as an initial reservation for purposes of IGRA.

Second, the Tribe's request proposes to transfer into trust nine parcels of land in Mashpee, five of which the Town either owns in fee or maintains reverter or other legal or

equitable rights. Contrary to the Tribe's assertions in its application, the Town has not yet agreed to transfer to the Tribe any of the Town's right, title, or interest in and to any of these parcels. The Town and Tribe have been engaged in lengthy negotiations regarding an intergovernmental agreement (IGA) which, inter alia, would address the transfer of title to these parcels; however, no such agreement has been reached. Without an IGA with the Tribe that protects the Town's and its citizens' interests in their real property and guarantees that land in Mashpee will not be used detrimentally for gaming purposes, the Town must oppose the proposed acquisition of the Mashpee lands. Cape Cod, as the Tribe notes in its application, has a fragile ecosystem, a unique and well-preserved history, and limited transportation infrastructure. Development of the scale that gaming usually entails will be extraordinarily detrimental to the environment and the character of the region. Under the Department's new off-reservation gaming policy issued on January 3, 2008, and because there is no guarantee that lands in Mashpee will not be available for gaming absent an agreement, the Town's opposition to the trust acquisition should lead the Department to reject the Tribe's request. Further, residential development undertaken in a fashion that does not conform to regional planning requirements will adversely affect the Town and surrounding region. For these reasons, without an IGA, the Town cannot support the acquisition and will not convey land it owns to the Tribe for purposes of this request.

Third, if BIA does not reject the request at the outset of the review, it must prepare an environmental impact statement (EIS) that covers the impacts of the proposed Mashpee and Middleborough acquisitions in a unified document. The requests must be considered together in a single EIS, as a result of the Tribe's unified trust acquisition request. In addition, the changes in the Town associated with the Tribe's proposed housing development, in combination with the

Tribe's proposed gaming development 30 miles away, will generate significant impacts. Although the greatest impacts are likely to be felt in Middleborough, residential development will significantly impact the Town. In addition, members of the Tribe residing in Mashpee will be commuting to Middleborough for the work opportunities that the casino will offer, thereby affecting traffic and congestion in the Town of Mashpee. Further, as long as all the lands involved in Mashpee and Middleborough are designated an initial reservation under 25 U.S.C. § 2719(b)(1)(B)(ii), the proposed uses are interchangeable, with gaming possible at either location. Thus, even if the Mashpee request is to be considered separately, an EIS is required.

To address these concerns, the Town has worked diligently, and continues to work, with the Tribe to develop an IGA that would allow the Town to support the Tribe's proposed trust acquisition. In consideration of these efforts, the Town requested a second extension to respond to BIA's request for comments. BIA has insisted, however, that the Town provide comments at this time, despite the long review process ahead. BIA's stance has, unfortunately, forced the Town to take an adversarial role at this early juncture. It is for that reason that the Town must file these comments opposing the trust land request.

The Town's comments are set forth in four sections. The first section provides background information on the Town, the Tribe's land claims lawsuit, and the efforts of the Town to reach an agreement with the Tribe. The second section sets forth the Town's specific objections to the Tribe's request. The third section provides preliminary comments on the required National Environmental Policy Act (NEPA) review. The fourth section provides the technical information sought by BIA's October 29, 2007 request.

II. DISCUSSION

A. Background

1. The Town of Mashpee

The Town of Mashpee is located on Cape Cod, a peninsula situated at the southeast corner of the Commonwealth of Massachusetts. The Cape is separated from mainland Massachusetts by the Cape Cod Canal, which the Army Corps of Engineers completed in 1914 to facilitate shipping through New England. The Town itself is located in the western part of the Cape, approximately 15 miles southeast from the Canal. Mashpee has a population of approximately 15,000 year-round residents and encompasses 29 square-miles within its territorial boundaries.

The Cape, shaped like a bent arm, is approximately 70 miles from the Canal to Provincetown's Race Point, the northeastern tip. Its width varies from 1 to 20 miles wide, and is completely surrounded by water, with Cape Cod Bay on the north, Buzzards Bay on the west, Vineyard and Nantucket Sounds on the south, and the Atlantic Ocean on the east. As a prime tourist destination with limited access and road infrastructure, travel on the Cape is very difficult, particularly in the summer months when tourism is at its peak and the Town's population doubles as seasonal residents move in.

The ecology of the entire Cape is fragile, and particularly so in Mashpee. Among the Town's natural attractions is the Lowell Holly Reservation, a 130-acre nature preserve on the shores of Wakeby and Mashpee Ponds, part of the largest freshwater pond complex on the Cape. It is the oldest private land trust in the country; the preserve contains 500 holly trees and harbors stands of Native American beech trees untouched for centuries, as well as some rare and

beautiful wildflowers. Eagles, osprey, and hawks are common. The Mashpee River Woodlands boasts eight miles of hiking trails along the Mashpee River, a protected waterway used for canoeing, bird watching and hiking. Recently, 2,200 acres in Mashpee have been proposed for inclusion in a new National Wildlife Refuge.

Because of the delicate ecology of Mashpee and the Cape, the Massachusetts state legislature created the Cape Cod Commission (CCC), the purpose of which is to protect the unique natural, coastal, historical, cultural, and other values threatened by uncoordinated or inappropriate uses of the region's land and other resources. The CCC is a regional planning and regulatory agency, responsible for preparing and implementing the Cape Cod Regional Policy Plan. The CCC, in conjunction with municipal boards and commissions, provides regulatory review processes and approvals for any development which has the potential to cause regional or local impacts. Within that regional development purview, the Town manages its affairs by an open Town Meeting form of government, wherein all of the Town's registered voters, including members of the Tribe, may vote on any matter requiring local legislative approval. The Town holds two Annual Town Meetings per year, in May and October and may also call additional Special Town Meetings, as needed. The chief executive body of the Town is an elected, five-member Board of Selectmen, which serves as the chief policy-making body within the Town government. Members of the Tribe have historically served, and one Member currently serves, on the Board of Selectmen. An appointed Town Manager is the chief administrative officer of the Town.

2. The Mashpee Wampanoag Tribe and the Land Claims

The relationship between the Tribe and the Town with respect to land and development has been controversial, primarily because of the Tribe's 1976 land claims suit asserting title to substantial portions of Town and privately-owned land located within Mashpee. In August of 1976, the Tribe sued in federal district court for recovery of approximately 1,600 acres of land located within the Town. The primary impetus for the suit was the Tribe's purported loss of political control over the Town with the influx of non-Indians into the area in the 1960s and the loss of free access to upland and shore areas, which had previously been accessible prior to development in the region.

The Tribe claimed that, beginning in 1842, the Commonwealth divided Mashpee ancestral lands that had been held in common by the Tribe and parceled them out to the Mashpee individually. In 1870, the Massachusetts state legislature adopted laws changing the Mashpee Indian District into a town and conveyed the remaining tribal lands to the town in its capacity as a body corporate and politic and a political subdivision of the Commonwealth. The Tribe claimed that by doing so, the Commonwealth violated the Indian Non-Intercourse Act, which requires federal approval of any transfer of tribal land to any other entity, including state and municipal governments.

The district court did not reach the merits of the Tribe's claims, however, because it dismissed the suit in 1977 on the ground that the Tribe did not meet the legal requirements of a federal Indian tribe. Only federal tribes can assert Non-Intercourse Act claims. A Non-Intercourse Act claim has four elements. The plaintiff must show that: 1) it is a "tribe" within the meaning of the Act; 2) the parcels of land were tribal land; 3) the United States never

consented to the alienation of the land; and 4) the trust relationship between the United States and the tribe was never terminated. *See Narragansett Tribe of Indians v. So. R.I. Land Develop.*, 418 F. Supp. 798 (D.R.I. 1976). After forty days of trial, the jury and the judge determined that the Mashpee did not constitute a "tribe" within the meaning of the Act at certain relevant times, and thus, the suit could not be maintained. *See Mashpee Tribe v. Town of Mashpee*, 447 F. Supp. 940 (D. Mass. 1978). The First Circuit Court of Appeals affirmed the district court's decision in 1978. *See Mashpee Tribe v. New Seabury Corp.*, 592 F.2d 575 (1st Cir. 1979), *cert. denied*, 444 U.S. 866 (1979).

Many of the residents of the Town have expressed concerns to Town officials regarding the Tribe's proposed and potential future acquisitions of trust land and how the Tribe's proposed development may affect the region. For that reason, the Town has worked diligently to negotiate an agreement that defines and limits the use of Tribal land and provides assurances regarding future development of such land.

3. History of the Town's Negotiations with the Tribe to Develop IGA

The Tribe received the Department's preliminary finding on Federal acknowledgment on March 31, 2006. Shortly thereafter, the Town requested an opportunity to meet with the Tribe. The Town and the Tribe commenced meetings and discussions among duly authorized representatives of the Board of Selectmen, Tribal Council, and legal counsel regarding post-recognition IGA issues in July 2006. Land claims and gaming in Mashpee were identified as the most pressing issues for the Town.

In September 2006, the Town prepared and shared with the Tribe a first draft Memorandum of Agreement, addressing the intergovernmental issues it anticipated upon final

recognition of the Tribe. Since that time, the Town and Tribe have met on at least six additional occasions to continue to pursue their negotiations on an IGA. Initially, the Tribe noted concerns about its legal authority to enter into such an agreement prior to final acknowledgment of the Tribe by the Department of the Interior. The Town, nonetheless, insisted on continuing the meetings. The Tribe received the Department's final finding on acknowledgment in February 2007. Despite nearly a year of persistent efforts to agree upon final terms of an IGA (nineteen months in total), the Town and Tribe have not yet resolved the issues of land claim releases and gaming activity in Mashpee.

The Town had hoped that it could withhold comment until such time as the parties had finalized their agreement, or resolved not to execute an IGA. The BIA, however, has insisted that the Town file comments before the parties could complete negotiations. For that reason, the Town must go on record objecting to the request.

B. Grounds for the Town's Objections to the Trust Land Acquisition Request

The Town objects to the proposed trust acquisition request because: 1) the application seeks a determination that the land involved in the request would be available for gaming purposes, which the Town opposes; and 2) the Town owns several of the parcels requested and, without an IGA, the Town will not convey the land to the Tribe, thereby preventing their acquisition in trust. Under the Department's new policy, the trust acquisition request should be denied.

1. The Tribe Has Requested a Determination that All Lands Involved Qualify for Gaming Purposes

The Tribe has requested that BIA acquire certain lands in trust on its behalf. In the Town of Mashpee, those lands include: (1) Old Indian Meeting House parcel (0.15 acres); (2) Town Cemetery (11.75 acres); (3) the Parsonage parcel (2.5 acres); (4) the Tribe's Museum (0.5 acres); (5) Tribal Council Offices (55 acres); (6) vacant land (10.81 acres); (7) vacant land (46.82 acres); (8) conservation land (burial ground) (0.361 acres); and (9) conservation land (8.9 acres). In the Town of Middleborough, the lands to be taken into trust include approximately 539 acres. Although the Tribe has stated that it does not intend to develop any of the Mashpee lands for gaming purposes,[1] it has nonetheless requested on page 2 of the trust land request a determination by the Secretary that all of the lands identified in the application constitute the initial reservation of a newly-recognized tribe on which gaming may be conducted.

The requested determination would help clear the path and provide a legal basis for the Tribe to engage in gaming activity in Mashpee. Section 20 prohibits gaming on lands acquired in trust after 1988 unless the lands are located within or adjacent to the boundaries of a reservation that existed on October 17, 1988 or, if the tribe did not have a reservation as of that

---

[1] The Tribe states in its application that it does not intend to use the Mashpee lands for gaming:

> The lands in Mashpee are unsuited to gaming or other economic development, however, because of their location on Cape Cod, which has a fragile ecosystem, including sensitive wetlands, and limited highway access. In recognition of these facts and of the wishes of the Town, the tribe has committed to not building a casino in the Town of Mashpee.

Letter from the Mashpee Wampanoag Tribe to Regional Director Franklin Keel (Aug. 30, 2007). The purposes proposed for the Mashpee lands are as follows: (1) Old Indian Meeting House – purpose to remain the same; (2) cemetery land – purpose to remain the same; (3) a Parsonage – purpose to remain the same; (4) a Mashpee Tribal Museum – purpose to remain the same; (5) Tribal Council Offices – purpose to remain the same; (6) vacant land to be used for tribal housing ; (7) vacant land to be used for tribal housing; (8) conservation land – purpose to remain the same; and (9) conservation land – purpose to remain the same.

date, the lands are within the tribe's last recognized reservation where the Indian tribe is presently located. 25 U.S.C. § 2719(a). Congress established three exceptions to the general prohibition on gaming on post-1988 lands, largely to accommodate newly-recognized tribes. Those exceptions cover land that is: 1) subject to the settlement of a land claim; 2) included in the initial reservation of an Indian tribe acknowledged by the Secretary under the Federal acknowledgment process; or 3) determined to be the "restored land" of an Indian tribe that is restored to Federal recognition. *Id.* § 2719(b)(1)(B)(i-iii). The Tribe is applying for permission to conduct gaming under the initial reservation exception. *See id.* § 2719(b)(1)(B)(ii).

As noted above, the Tribe has stated that it does not intend to offer gaming on the Mashpee lands. Nonetheless, this statement of intent does not guarantee that the Tribe would not, at some future date, convert use of the Mashpee lands to gaming. Without an enforceable agreement specifically defining permissible gaming activities and/or prohibiting gaming in perpetuity, the Town must assume the worst-case scenario, leaving it no choice but to oppose the Tribe's request. Based on the Town's opposition, the BIA should decline the Tribe's request.

Under new Departmental policy, the Town's opposition is ground for rejecting the Tribe's entire request. On January 3, 2008, the Department of the Interior issued guidance applicable to processing gaming-related trust acquisitions under the trust acquisition regulations. *See* Memorandum from Assistant Secretary Carl Artman to Regional Directors, BIA, George Skibine, Office of Indian Gaming (Jan. 3, 2008). The guidance focuses on two criteria in the trust land regulations that require the Secretary to give: 1) greater scrutiny to the tribe's justification of anticipated benefits from the proposed acquisition; and 2) greater weight to concerns raised by state and local governments as to the acquisition's potential impacts on

regulatory jurisdiction, real property taxes, and special assessments. *See* Jan. 3 Memorandum (discussing 25 C.F.R. § 151.11(b)). With respect to the anticipated benefits of the proposed acquisition, the Department will look closely at whether the distance between the reservation and the proposed gaming site is commutable – that is, whether a tribal member living on the reservation could reasonably be expected to commute to the casino from the reservation. The Department will also accord greater weight to the concerns of local governments about the tax and jurisdictional impacts and whether the gaming facility is compatible with current zoning and land use requirements. The Department is to scrutinize the impacts of a gaming facility on traffic, day care centers, schools, churches, and residential developments. The guidance directs that all pending or new applications be screened initially in accordance with the new guidance and that if the initial review fails to address or does not adequately address the issues identified in the guidance, the application should be denied.

Under this guidance, the BIA should reject the Tribe's application until an enforceable agreement is in place that assures the Town that the land will not be used for gaming purposes. There is no doubt that gaming development is completely incompatible with the Town and the surrounding Cape. Such a result is required by the recent decision regarding the United Keetowah Band of Cherokee Indians of Oklahoma, where the Department denied the request of a landless tribe because of the objections of the state government and the lack of an agreement between the Tribe and the local government. *See* Letter from Asst. Secretary C.J. Artman, Department of the Interior to Chief G. Wickliffe, United Keetoowah Band of Cherokee Indians (Jan. 4, 2008).

Gaming is not currently permitted as a matter of law in Massachusetts, with the exception of bingo, beano, and other lottery events sponsored by charitable or social organizations and permitted on a case-by-case basis by local and state authorities. Given the statewide legal restrictions on mid- to large-scale gaming activities, the Town of Mashpee has not adopted any Zoning Bylaws, Regulations, or policies to govern this specific type of land use. Nor do its existing Bylaws, Regulations, and policies address the potential impacts of such uses on neighboring properties. Mashpee is a predominantly residential community, with a few concentrated areas of commercial and industrial use, principally located along state highways or "major" roads. There are no large hotels or resort/recreational facilities in Mashpee. There are few, if any, large, undeveloped tracts of land in the Town that would be suitable for any gaming or hotel/resort destination due to the environmental, access, and/or topographical conditions affecting these sites. Furthermore, the existing roadway infrastructure in the Town and the Upper Cape Cod region and, indeed, access to the Cape itself, are clearly inadequate for any such use.

As noted above, Mashpee, like Cape Cod generally, has a fragile ecosystem. In an effort to preserve what open natural lands survive, over the past several years the Town has prioritized its efforts to obtain whatever funds may be available to acquire land for conservation and open space purposes. Water supply in the Town is provided by the Mashpee Water District, a separate governmental entity, whose input on any major development project and the project's impact on water supply capacity would be necessary. A major concern among Town residents and Town officials alike is the lack of public sewerage or wastewater disposal facilities serving properties in the Town. All wastewater generated in Mashpee is treated and disposed of by privately-owned and maintained treatment/disposal facilities. The proliferation of these in-ground disposal

systems and the high levels of nitrogen they generate have so adversely affected waterways and coastal bays within the Town that the Town has been compelled to adopt stringent de-nitrification standards and requirements in conjunction with new or upgraded wastewater disposal systems servicing Town properties. Discussion of wastewater/stormwater disposal alternatives is currently a major agenda item for many Town boards and agencies; however, long-term remedies for this problem are both costly and challenging from an engineering perspective. Any gaming enterprise in Mashpee would likely face substantial, if not insurmountable, environmental hurdles, given these infrastructure concerns.

In light of these conflicts, and the new Departmental guidance, the Tribe's application, as currently structured, cannot be granted. The BIA should decline the application now in its entirety.

2. The Town Will Not Transfer Lands to the Tribe without an IGA

The Tribe's application indicates that the Town will transfer its title to certain parcels of land – the Old Indian Meeting House parcel, the Town Cemetery, the Parsonage parcel – and will release the Town's reverter interest and deed restrictions in the Tribe's Museum and Tribal Council Offices parcels so that the land may be acquired in trust for the Tribe. This is an inaccurate and presumptive assertion by the Tribe. Without an IGA guaranteeing that this land will not be used for unapproved gaming purposes and that the Tribe will not pursue land claims against any land within the Town, the Town will not transfer the title to these parcels to the Tribe.

In a letter issued by the Mashpee Wampanoag Tribal Council President, dated September 28, 2006, which was incorporated as an Exhibit to the Tribe's Application and is

appended hereto as Exhibit 1, as well as in numerous other public statements by its representatives, the Tribe has assured the Town and its citizens that the Tribe "will file no land claims to land held in private hands in the Town of Mashpee or elsewhere on Cape Cod." In addition to protecting the real estate interests of its residents and business owners, the Town has an obvious interest in protecting and securing the status of Town-owned real estate. To this end, and in conjunction with the ongoing IGA negotiations with the Tribe, the Town assembled an inventory of all Town-owned property and made this inventory available to the Tribe. In exchange for a binding IGA commitment by the Tribe not to pursue land claims against privately-owned and Town-owned property, the Town is prepared to pursue all steps necessary to convey the Mashpee lands identified in the Tribe's Trust Application to the Tribe, subject to authorization by the Mashpee Town Meeting, as required by Massachusetts General Laws, Chapter 40, sections 15 and 15A. No progress will be made in this regard, however, without a final IGA in place.

Furthermore, with respect to the parcel identified as the "Town Cemetery," other legal impediments may preclude this parcel from being placed into trust. This parcel was acquired by the Town in 1874 and, based on available information, has been utilized as a public/municipal cemetery since that time. Municipal cemeteries and burying places are governed by the provisions of General Laws, Chapter 114, sections 10 *et seq.* This statute places certain obligations upon towns to maintain the availability of and to preserve, in perpetuity, burial lots for the interment of persons dying within their territorial limits. Notably, Section 17 of Chapter 114 provides that "a town shall not alienate or appropriate to any other use than that of a burial ground, any tract of land which has been for more than one hundred years used as a burial place; and no portion of such burial ground shall be taken for public use without special authority from

the general court." Thus, as a matter of Massachusetts law, the authority of the Town to convey this parcel to the Tribe is questionable without a Special Act of the Massachusetts legislature. The future responsibility and liability for providing burial lots at the subject parcel and assuring the availability of same for the general population of the Town, which is now the duty and responsibility of the Town, must also be addressed, presumably by an IGA, before this parcel could conceivably be transferred to the Tribe.

Consequently, the BIA will not be able to acquire the Mashpee lands in trust, and must decline the Tribe's request.

C. The BIA Must Prepare an EIS Covering the Entire Proposal

A thorough EIS is required for the proposed acquisitions in both Mashpee and Middleborough. Section 101 of NEPA declares a broad national commitment to protecting and promoting environmental quality. *See Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 348 (1989). To ensure that this commitment is "infused into the ongoing programs and actions of the Federal Government, the act also establishes some important 'action-forcing' procedures." 115 Cong. Rec. 40416 (remarks of Sen. Jackson). Section 102 directs, among other things, that agencies contemplating a major federal action assess the environmental impacts of a proposed action in an EIS, before committing to that action.

The purpose behind section 102's EIS requirement is to ensure that the agency, in reaching its decision, carefully considers detailed information concerning significant environmental impacts and that such information is made available to the larger audience that may also play a role in both the decision-making process and the implementation of that decision. *See Baltimore Gas & Electric Co. v. Natural Resources Defense Council, Inc.*, 462

U.S. 87, 97 (1983); *Weinberger v. Catholic Action of Hawaii/Peace Education Project*, 454 U.S. 139, 143 (1981). Assessing the environmental impacts of a proposed action enables an agency to engage in informed decision-making.

1. An EIS Is Required for the Proposed Action

Although the BIA has not announced that it is initiating NEPA review, an EIS is required. NEPA requires the preparation of an EIS for "major Federal actions significantly affecting the quality of the human environment." 42 U.S.C. § 4332(C). The purpose behind this requirement is to ensure that an agency, "in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts." *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989). Moreover, such information must be made available to the public for review. *Id.*

The Tribe's proposed development requires an EIS. The Department has adopted the policy of preparing EISs for all gaming-related development.[2] Casino development, particularly where Class III gaming will be conducted, as the Tribe has proposed in this case, has substantial traffic, noise, water, pollution, crime, and quality of life impacts. BIA's 2005 Checklist provides that "[p]roposals for large, and/or potentially controversial gaming establishments should require

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[2] *See, e.g.*, National Indian Gaming Commission Notice of Availability of a Draft Environmental Impact Statement and a Draft Conformity Determination for the Proposed Federated Indians of the Graton Rancheria Casino and Hotel Project, Sonoma, CA, 72 Fed. Reg. 10790-04 (Mar. 9, 2007); Bureau of Indian Affairs Notice of Intent To Prepare an Environmental Impact Statement for the Proposed Hannahville Tribe of Potawatomi Indians' Hotel and Casino Project, Romulus, MI, 72 Fed. Reg. 7068-02 (Feb. 14, 2007); Bureau of Indian Affairs Notice of Availability of Draft Environmental Impact Statement for the Proposed Transfer From Fee-to-Trust Land of Oneida Indian Nation of New York Land in Oneida and Madison Counties, NY, 71 Fed. Reg. 67896-01 (Nov. 24, 2006); Bureau of Indian Affairs Final Environmental Impact Statement for the Elk Valley Rancheria's Proposed 203.5 Acre Martin Ranch Fee-to-Trust Transfer and Casino/Resort Project, Del Norte County, CA, 71 Fed. Reg. 59127-02 (Oct. 6, 2006).

the preparation of an EIS, especially if mitigation measures are required to reduce significant impacts."

Because the Tribe has submitted a joint application to have lands in Mashpee and Middleborough acquired in trust and designated the initial reservation of the Tribe for gaming purposes, the EIS should address the development in both locations and treat such development as interchangeable. The application is a single proposed federal action and all of the land will share the same status. As such, any activity permissible at one site would be permissible at the other. One comprehensive EIS is particularly appropriate, given that the casino, regardless of its location, will provide employment and training opportunities for tribal members, many of whom will travel from one location to the other to take advantage of the services the Tribe will provide and the employment opportunities the casino development will offer. To capture the impacts associated with the proposed action, the BIA must evaluate all of the land in a single EIS.

2. The Town Must Be Included as a Cooperating Agency

In addition, the Town should be designated as a cooperating agency for purposes of NEPA compliance. Under the Council on Environmental Quality regulations, a "cooperating agency" can include any state or local agency that has "jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal." 40 C.F.R. § 1508.5. Whereas federal agencies meeting those qualifications are required to participate as cooperating agencies upon request of the lead agency, *see id.* § 1501.6, state and local entities are strongly encouraged to do so through agreement with the lead agency. *Id.* Clearly, the Town qualifies in that it has "jurisdiction by land" and "special expertise" with respect to the environmental impacts the proposed project will generate. In fact, given that the Town owns or possesses an interest in

several of the parcels of land for which trust status is being sought, the Town should be included as a cooperating agency. Moreover, under NEPA, BIA owes a higher duty because the Tribe's proposal is at odds with local land use. *See Maryland-National Capital Park and Planning Comm'n v. U.S. Postal Service*, 487 F.2d 1029, 1036 (D.C. Cir. 1973). Town participation will help BIA meet that duty.

Having the Town participate as a cooperating agency will substantially improve the environmental review process. NEPA guidance indicates that the "benefits of enhanced cooperating agency participation in the preparation of NEPA analyses include: disclosing relevant information early in the analytical process; applying available technical expertise and staff support; avoiding duplication with other Federal, State, Tribal and local procedures; and establishing a mechanism for addressing intergovernmental issues," and that enhanced cooperating agency participation "foster[s] intra- and intergovernmental trust (e.g., partnerships at the community level) and a common understanding and appreciation for various governmental roles in the NEPA process, as well as enhancing agencies' ability to adopt environmental documents." Memorandum for the Heads of Federal Agencies from James Connaughton, Council on Environmental Quality (January 30, 2002). Such goals are particularly important here, where a transfer of jurisdiction over substantial lands would occur between the Town and the Tribe, and where this transfer would have long-term impacts on the relationships of these neighboring governments. Fostering a strong and cooperative inter-governmental relationship by including the Town as a cooperating agency would be highly beneficial.

President Bush has, in fact, directed federal agencies to include local governments in the environmental process "in a manner that promotes cooperative conservation, with an emphasis

on appropriate inclusion of local participation in Federal decisionmaking, in accordance with their respective agency missions, policies, and regulations." Executive Order 13352, Facilitation of Cooperative Conservation (Aug. 26, 2004). The Department of the Interior and its agencies are to carry out their programmatic duties in a manner that: 1) facilitates cooperative conservation; 2) takes appropriate account of and respects the interests of persons with ownership or other legally recognized interests in land and other natural resources; 3) properly accommodates local participation in Federal decision-making; and 4) provides that the programs, projects, and activities are consistent with protecting public health and safety. *Id.* To that end, it is critical that the Town be included as a cooperating agency in the environmental review process.

D. Response to BIA Questions

The Town has provided more extensive comments on the proposed acquisitions in order to bring to the BIA's attention serious problems with the Tribe's application. Most of those problems can be resolved only through the development of an IGA with the Tribe. The Town's intent is to provide the BIA with this information before it invests time and resources into reviewing an application that cannot be granted. The BIA, however, has requested only a very limited amount of information. The following responds to the BIA's request.

1) BIA requested information regarding the annual amount of property taxes currently leveled on the property. The current amount of property taxes is set forth in the table below.

Property	Property Tax	Property Tax
Parcel 1: Old Indian Meeting House	Exempt- Town owned	Exempt- Town owned
Parcel 2: Town Cemetery	Exempt- Town owned	Exempt- Town owned
Parcel 3: Parsonage	Exempt- Town owned	Exempt- Town owned
Parcel 4: Tribe's Museum	Exempt	Exempt
Parcel 5: Tribe's Council Offices	Exempt	Exempt
Parcel 6: Vacant Land	Exempt	Exempt
Parcel 7: Vacant Land	Exempt	Exempt
Parcel 8: Conservation Land (burial land)	Exempt	Exempt
Parcel 9: Conservation Land	Exempt	Exempt

2) BIA requested information regarding any special assessments, and amounts thereof, which are currently assessed against the property. Special assessments include water rates, charges, and betterments assessed by the Mashpee Water District and possible street/sidewalk betterments assessed by the Town of Mashpee.

3) BIA has requested information regarding any governmental services which are currently provided to the property by the Town's jurisdiction. The Town currently provides services, including police, fire-protection, emergency medical services, public school for residential properties, maintenance of public ways serving all parcels, maintenance of Town-owned parcels.

4) BIA has requested information regarding how the land is currently zoned. The properties are zoned as follows:

Property	Zoning Designation
Parcel 1: Old Indian Meeting House	R-3, Residential
Parcel 2: Town Cemetery	R-3, Residential
Parcel 3: Parsonage	R-5, Residential
Parcel 4: Tribe's Museum	R-5, Residential, and Mashpee Center Overlay District
Parcel 5: Tribal Council Offices	R-3, Residential
Parcel 6: Vacant Land	R-5, Residential
Parcel 7: Vacant Land	R-5, Residential
Parcel 8: Conservation Land (burial land)	R-3, Residential
Parcel 9: Conservation Land	R-3, Residential

III. CONCLUSION

For the reasons discussed herein, the Town opposes the proposed trust acquisition. The Tribe has requested a determination that all of the lands involved in the proposed acquisition qualify for gaming purposes under section 20 of IGRA. Such development is antithetical the character of the region and would be highly detrimental to the fragile Cape environment. Without the support of the Town, the Tribe's request should be rejected. If BIA continues to process the Tribe's request, an EIS is required. That EIS must evaluate less harmful alternatives than trust land acquisition for the proposed uses. BIA must deny the Tribe's request.

Mashpee Wampanoag Tribal Council
483 Great Neck Road, South • P.O. Box 1048 • Mashpee, Massachusetts 02649
508-477-0208 • FAX 508-477-1218

September 28, 2006

Board of Selectmen
Town of Mashpee
Mashpee, Massachusetts

Ladies and Gentlemen:

As you know, on March 31, 2006, the United States Department of the Interior issued a proposed finding that the Mashpee Wampanoag Indian Tribe exists as an Indian tribe within the meaning of federal law. Comments on that proposed finding are due from interested parties by October 3, 2006. A final decision is due by March 31, 2007. Our Tribe has fought for this simple, but profound, affirmation of our people and community for over 30 years. I cannot understate how much recognition will mean to our people in terms of basic dignity. Because of the strength of the preliminary finding, we are optimistic of a positive finding.

Remembering the bitter conflict over land and sovereignty that was fought between the Town and the Tribe in the 1970s, after the preliminary decision had been issued, we have participated in a series of what we thought had been very constructive discussions with the committee of the Board of Selectmen and the Town manager in order to address the concerns of our fellow citizens and to talk about how the Tribe's recognition (which will potentially mean an influx of federal dollars) could benefit the Town.

Recently, those discussions have taken an unforeseen turn. We have been told that unless we sign a Memorandum of Agreement with severe restrictions on our rights and future, the Town would file an objection to recognition.

Given the solidity of the BIA's preliminary finding and the clarity to be found in decided law on the Tribe's right to seek recognition, the Tribe believes that such an action could only be viewed as mean spirited and punitive. It would mean a return to the old days of spending millions of taxpayer dollars in an effort to deny basic dignity to our people who have been good stewards of a place called Mashpee since time immemorial. We respectfully ask you to turn back from that destructive and wasteful course of action.

Let us make some things clear:

1. Federal Recognition is simply that: The United States recognizing that a Tribe meets 7 very specific criteria and that a government to government relationship exists after recognition.

2. All land and legal issues come after that. The Tribe and Town will enter into negotiations when the Tribe takes land into trust, by law.

We understand people being concerned despite our long held and expressed policies.

Accordingly, the Tribal Council met on September 28, 2006 and unanimously authorized me, as President of the Tribal Council, to inform the Board of Selectmen, as follows:

1. When recognized, the Mashpee will file no land claims to land held in private hands in the Town of Mashpee or elsewhere on Cape Cod.

2. When recognized, the Mashpee will not build a casino in the Town of Mashpee or elsewhere on Cape Cod.

Frankly, the Tribal Council has taken these actions out of both concern for our Town and because we see both as being in the Tribe's best interests.

As for land claims, we simply have no desire to disrupt the peace and sanctity of you, our neighbors, friends and family. Pursuing such claims would cost us all millions of dollars. We think that would be a waste of time, energy and resources. We wish to leave the past in the past. Our only goal is to strengthen the Mashpee as a self reliant community.

As for gaming, if we are able to be involved in a gaming venture after complying with lots of laws and regulations, we are going to be involved in the best casino gaming venture possible in order to maximize economic return to the Tribe. That being the case, building a casino in Mashpee is simply not a good idea as a business matter. You don't have to take our word on it, we have been told that by experts. You can be, too. The reason operating in Mashpee would not be optimal is because of the simple fact that a person has to cross a two lane bridge (renowned to all of us for back ups!) and then travel further by two lane highways. Again, we do not intend to build in Mashpee.

However, entering in to an agreement giving up any economic avenues prior to recognition could be extremely harmful to the Tribe and no benefit to the Town.

So, I know you are saying why won't the Tribe sign our memorandum given these intentions. The answer lies in law and history.

It is premature to enter into any official agreement that has little or no value. As stated above, we firmly believe that the Tribe will be recognized. When we are recognized, we eagerly look forward to working with all governments to develop agreements and development plans that serves all of us.

Over the course of U.S. history, trusting Native American Tribes have consistently hurt themselves by being pressured or threatened into one-sided agreements. We know that and you know that. The Mashpee Wampanoag Tribe is not going to do that. We have worked for over 30 years for equality and dignity and if we have to work longer and spend more because of the Town's actions, we will. History has also proven that peace at any price never works.

In conclusion, we ask you to respect and trust us. We have given our word. That is sacred in our culture. We will not take our fellow citizens' homes. We will work with you responsibly and collaboratively on all development issues that affect the Tribe and Town. Please reject the politics of prejudice. Join the 7 other Towns on Cape Cod that have endorsed our place in history. The decision is yours. Thank you for your consideration of these matters.

Very truly yours,

Glenn Marshall

Glenn Marshall
President

From: Origin ID: JPNA (202)434-1656
Rebecca Brezenoff
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607 Fourteenth Street, NW

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FedEx Express

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Account#: S *********

Delivery Address Bar Code

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Franklin Keel, Director
BIA Eastern Regional Office
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Suite 700
Nashville, TN 37214

Ref # 60777-0001
Invoice #
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Dept #

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ATTACHMENT 3

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May 15, 2008

The Honorable Carl J. Artman
Assistant Secretary - Indian Affairs
U.S. Department of the Interior
Room 4160
1849 C Street, N.W.
Washington, DC 20240

Dear Assistant Secretary Artman:

On behalf of the Town of Mashpee, Massachusetts, I want to thank you for your April 7, 2008 letter regarding the Intergovernmental Agreement ("Agreement") between the Town and the Mashpee Wampanoag Tribe. As you know, the Agreement resolves certain disputes relating to land in the Town and the Tribe's proposed trust acquisition request, which is now under the Department's consideration. The Tribe and Town have worked closely over the last two years to develop the Agreement and to promote and assure a cooperative and mutually beneficial relationship.

Your April 7, 2008 letter indicates that, based on your preliminary review, the Agreement appears to satisfy the standards for approval under 25 U.S.C. § 81, which would apply at such time as the Department determines that it will acquire the land in trust. The Town overwhelmingly approved the Agreement at an April 7, 2008 Special Town Meeting convened for that purpose. The Tribal Council had previously approved the Agreement, upon endorsement of its terms by vote of the Tribe. On April 22, 2008, the Town and the Tribe formally executed the Agreement, Rider A to the Agreement, and a separate Agreement pertaining to future use and operation of the Town Cemetery parcel which is being transferred to the Tribe. Copies of these documents are enclosed with this letter.

The Town has agreed to fulfill certain Agreement obligations before the Department will complete its review of the Tribe's proposed trust acquisition request and formally confirm that the Agreement meets Section 81 requirements. In satisfaction of those obligations, the Town has executed, or will imminently execute, deeds transferring the title of the Town to five parcels of land located in Mashpee to the Tribe. The Town, furthermore, hereby formally withdraws the objections to the Tribe's pending trust land acquisition request set forth in the Town's comment letter of January 25, 2008, and it hereby expresses its support for the land trust acquisition request as it relates to lands located in Mashpee.

Thank you for your consideration and assistance with respect to finalization and execution of the Intergovernmental Agreement. The Town looks forward to a continued positive and constructive dialogue with Tribe leaders to advance the mutual interests of the residents of Mashpee and Mashpee Wampanoag Tribe members.

Very truly yours,

Patrick Costello
Town Counsel
Town of Mashpee

cc: Mr. Franklin Keel, Regional Director, Bureau of Indian Affairs
Guy Martin, Esq.
Board of Selectmen (w/o encl.)
Chairman Shawn Hendricks (w/o encl.)
William McDermott, Esq. (w/o encl.)

ATTACHMENT 4

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*not admitted in d.c.

February 29, 2008

By Email; Original By Mail

Chairman Shawn Hendricks
Mashpee Wampanoag Tribe
P.O. Box 1048
Mashpee, MA 02649-2203

Re: Applicability of 25 U.S.C. § 81 to Intergovernmental Agreement between the Mashpee Wampanoag Tribe and the Town of Mashpee, Massachusetts

Dear Chairman Hendricks:

You have asked for our formal opinion as to whether 25 U.S.C. § 81 ("Section 81") applies to the Intergovernmental Agreement between the Mashpee Wampanoag Tribe ("Tribe") and the Town of Mashpee, Massachusetts ("Town") as approved by the Tribal Council on February 20, 2008. As we explain below, it is our opinion that Section 81 does not apply to this Intergovernmental Agreement. As a result, the Tribe need not submit the Agreement to the Secretary of the Interior for approval.

1. The Agreement

As you are aware, under this Agreement the Town agrees to convey several parcels it now owns to the Tribe for the purpose of having those parcels taken into trust by the United States for the Tribe. The Agreement also obligates the Town to support the United States taking other lands now owned by the Tribe or tribal entities into trust. In addition, the Town agrees to remove certain existing restrictive covenants the Town had imposed on other parcels owned by the Tribe or tribal entities. None of these lands covered by the Agreement are currently held in trust for the Tribe by the United States nor is any such parcel now subject to a restriction on

alienation by federal law. On August 30, 2007, however, the Tribe filed an application with the Secretary of the Interior to take most of these parcels into trust for it.

In addition, the Agreement establishes a process for intergovernmental cooperation between the Tribe and Town with respect to the management both of tribal trust lands and adjacent areas. The Tribe agrees not to conduct gaming under the Indian Gaming Regulatory Act, 25 U.S.C. §§ 2701-2721, or to file any claims to ownership of other lands within the Town that are in private or Town ownership. The Agreement provides, however, that the Town may in the future voluntarily agree to convey lands owned by the Town to the Tribe.

The Agreement creates a dispute resolution process under which disputes that cannot be resolved by negotiation are submitted to arbitration and the arbitrator's (or arbitrators') decision may be enforced in the Massachusetts Superior Court for Barnstable County. The arbitration and court determinations are limited to a declaration of the parties' rights, duties and adequacy of performance under the Agreement and an order directing either party to specifically perform the Agreement. Nothing in the Agreement allows the Town under any circumstances to use or possess any lands taken into trust for the Tribe.

2. Section 81

Congress enacted the current version of Section 81 in 2000 in the Indian Tribal Economic Development and Contract Encouragement Act of 2000, Pub. L. No. 106-179, § 2 (2000), 114 Stat. 46, 46-47 ("Contract Encouragement Act"). In this Act, Congress substantially rewrote 25 U.S.C. § 81, which had been originally enacted in 1871. Under this 1871 statute, tribes and Indians had been required to obtain the approval of the Secretary of the Interior for all contracts and agreements that authorized payment to third parties for "services for . . . Indians . . . relative to their lands." More specifically, prior to the enactment of the Contract Encouragement Act in 2000, Section 81 provided that:

> No agreement shall be made by any person with any tribe of Indians, or individual Indians not citizens of the United States, for the payment or delivery of any money or other thing of value, in present or in prospective, or for the granting or procuring any privilege to him, or any other person in consideration of services for said Indians relative to their lands . . . unless such contract or agreement be executed and approved as follows:
>
> . . .
>
> **Second.** It shall bear the approval of the Secretary of the Interior and the Commissioner of Indian Affairs indorsed upon it.

25 U.S.C. § 81 (pre-2000 version).

Moreover, under the old statute, if a contract was covered by Section 81 and the parties had failed to obtain the Secretary's approval for it, not only the parties to the contract but any

person could sue on behalf of the Tribe (or individual Indian) in a *qui tam* action to recover all funds paid under the contract. If the plaintiff won, the contract would be declared null and void and all monies paid to a non-Indian by a tribe or Indian under the contract would be disgorged; the plaintiff would receive half of the recovery and the other half would go to the U.S. Treasury for the use of the Tribe (or individual Indian). See S. Rep. 106-150, at 5-7 (1999) [hereafter S. Rep].

Congress replaced this 19th century provision because it determined that the provision had caused great uncertainties for tribes, individual Indians and parties who wished to enter into contracts with them, and because tribes, parties contracting with tribes, the Interior Department and the courts had found it difficult to determine whether a contract was "relative . . . to lands." S. Rep. at 2-7. Congress determined that the uncertainty in the scope of Section 81 and the risk that contracts with Tribes would be ruled void for failure to obtain Secretarial approval undermined tribal self-determination and impeded Tribal business development. *Id.* To address these problems, the 2000 Act was intended "to clarify which agreements with Indian Tribes require federal approval," *id.* at 1, "to encourage Indian economic development [and] to provide for the disclosure of Indian tribal sovereign immunity in contracts," and to "eliminate a major portion of federal control exercised pursuant to Section 81 by making federal approval only applicable to certain contracts having a life of seven or more years," H. Rep. 106-501 at 1-2 (2000).

The current Section 81 that replaced the 19th century statute now requires in pertinent part that "[n]o agreement or contract with an Indian tribe that encumbers Indian lands for a period of 7 or more years shall be valid unless that agreement or contract bears the approval of the Secretary of the Interior or a designee of the Secretary." Section 81(b). The new statute defines "Indian lands" as "lands the title to which is held by the United States in trust for an Indian tribe or . . . held by an Indian tribe subject to a restriction by the United States against alienation." *Id.* at § 81(a)(1). In discussing this language, the Senate Committee explained that "Section 81 will no longer apply to a broad range of commercial transactions. Instead, it will only apply to those transactions where the contract between the tribe and a third party could allow that party to exercise exclusive or nearly exclusive proprietary control over the Indian lands." S. Rep. at 9.

3. Interior Department regulations implementing the new Section 81

The Secretary of the Interior was required by Section 2 of the Contract Encouragement Act, 25 U.S.C. § 81(e), to adopt regulations to implement the new statute. These regulations further clarify the circumstances under which Secretarial approval of a contract is required. Following the statute, the regulations provide that Secretarial approval is required for contracts "that encumber tribal lands for a period of seven or more years . . . ." 25 C.F.R. § 84.003. The regulations define "encumber" to mean:

> to attach a claim, lien, charge, right of entry or liability to real property (referred to generally as encumbrances). Encumbrances covered by this part may include leasehold mortgages, easements, and other contracts or agreements that by their terms could give to a third party exclusive or nearly exclusive proprietary control over tribal land.

Id. at § 84.02. The Notice in the Federal Register announcing the adoption of the final rule defines "third party" as:

> any party outside the tribe who, under the terms of the contract or agreement, could gain exclusive or nearly exclusive proprietary control over tribal land, such as a lender or the holder of a secured interest in any improvements for a transaction involving a tribe and a potential lessee.

66 Fed. Reg. 38918, 38919 (July 26, 2001).

The regulations also set forth circumstances under which Secretarial approval is not required. Among the examples listed are "[c]ontracts or agreements that do not convey exclusive or nearly exclusive proprietary control over tribal lands for a period of seven years or more." *Id.* at § 84.004(e).

4. Legal Analysis

The Tribe's Intergovernmental Agreement with the Town does not require Secretarial approval under the current Section 81 for several reasons.

First, no lands covered by the Agreement come within the statute's definition of "Indian lands." None of these lands are now held in trust for the Tribe by the United States or owned by the Tribe subject to a restriction by the United States against alienation.

Second, even if the fact that the Tribe has applied to take most of the parcels covered by the Agreement into trust were to make the statute applicable, nothing in the Agreement encumbers these parcels as that term is used in the statute and implementing regulations. Under the Intergovernmental Agreement, the Town will retain no control over the lands once they are taken into trust, much less an "exclusive or nearly exclusive proprietary control" over the lands. The parcels will under no circumstances revert to the Town, the Town retains no right of entry to use or possess the lands and the Agreement creates no lien of any kind on the lands. Under the dispute resolution provision of the Agreement, the Town is limited to legal enforcement of the Agreement as an ordinary contract, by compelling specific performance of the Agreement or a declaration of the Town's rights or Tribe's duties under the Agreement.

Finally, although the Tribe intends to place the lands covered by the Agreement into trust, the Agreement does not include a provision requiring that lands be placed in trust or conditioning the Tribe's ownership of the lands on their being placed in trust. Nor does the Agreement

impose any consequences – such as a reversion of the lands to the possession or ownership of the Town – should the Tribe fail to seek or obtain trust status for the lands or should the Tribe breach the Agreement. Again, the Agreement will not under any circumstances give the Town any legal proprietary interest in the lands, such as a right of entry or a right to use or possess the lands.

The only two federal court decisions that have considered the reach of the current Section 81 support our conclusion that this statute does not apply to the Agreement. *See GasPlus, L.L.C. v. United States Department of the Interior*, 510 F.Supp.2d 18 (D.D.C. 2007); *Guidiville Band of Pomo Indians v. NGV Gaming, Ltd.*, 2005 WL 5503031 (N.D. Cal. 2005). In both these cases, the Court determined that Section 81 applies only when a specific contract between a tribal government and a private party "encumbers" tribal lands, and explained the circumstances under which a particular set of burdens on the lands constitutes an encumbrance so as to trigger Section 81.

Of the two cases, *GasPlus* is by far the more comprehensive analysis of the new Section 81. In *GasPlus,* the United States District Court for the District of Columbia overturned a decision by the Acting Assistant Secretary of the Interior that an agreement the Nambe Pueblo had entered into with GasPlus to "manage, supervise, and operate [Nambe Pueblo's] Gasoline Distribution Business," located on tribal trust lands, 510 F.Supp 2d at 23 (citation omitted), required Section 81 approval. The court determined that this contract did "not 'encumber Indian land' within the meaning of Section 81." *Id.* at 27. The court observed that in contrast to the original Section 81 – which it concluded embodied a "paternalistic policy towards Indian tribes prevalent at the end of the nineteenth century," *id.* at 28 (quoting 65 Fed. Reg. 43,952 (July 14, 2000)), Congress' goal in the new statute was to bring the Section's "antiquated treatment of Indian tribes in line with modern attitudes toward tribal self-determination." *Id.* at 28. Unlike the original version of section 81, the court found that the purpose of the 2000 amendments to Section 81 was:

> to encourage third parties to enter into business relationships with Indian tribes by clarifying and significantly reducing the scope of prior Section 81. The amended statute would still require "a limited number of transactions" to be submitted for BIA approval, but the overall goal of the amendments was to reduce Government oversight of Indian economic activity.

Id. at 25 (citations omitted). In amending Section 81, the court observed, Congress "determined that it is in the interest of Indian tribes to be free from bureaucratic oversight of their economic endeavors in all but a narrow category of circumstances." *Id.* at 33.

The district court determined that "the key phrase upon which this case turns is 'encumber Indian lands,'" a term embedded in both the statute and regulations. *Id.* at 28 (citations omitted). The court concluded that,

> under Section 81 and the implementing regulations, a contract that "encumbers

> Indian lands" is a contract that, by its terms, provides a third party with a legal interest in the land itself; that is, a right or claim attached to the real property that would interfere with the tribe's exclusive proprietary control over the land.

Id. at 29. It then determined that the management agreement did not require Section 81 approval because it gave *GasPlus* no "legal right or interest in the Nambe Pueblo's real property" and thus did not "encumber" the Pueblo's lands. *Id.*

While the court acknowledged that the agreement empowered the non-Indian company to operate a business on tribal lands, it concluded that "the legislative history of the 2000 amendments to Section 81 makes clear that as long as the land itself remains within a tribe's proprietary control, an agreement that merely relates to the land does not require the BIA 's approval." *Id.* at 30. Rejecting the Acting Assistant Secretary's view that an agreement authorizing a non-Indian entity to use tribal lands requires Section 81 approval, the court determined that "a third party's right to use tribal land must be in the nature of a legal interest that interferes with a tribe's proprietary control over the land," such as a restrictive covenant or a right of entry to recover improvements. *Id.*

The district court explained that by amending Section 81, "Congress fundamentally changed Section 81 by emphatically narrowing its scope to apply only to 'a limited number of transactions that could place tribal lands beyond the tribe's ability to control the lands in its role as proprietor.'" *Id.* at 33 (citations omitted). The court emphasized that if the Pueblo defaulted under the agreement, GasPlus would have no recourse against the Pueblo's land itself, but merely a right to bring an ordinary breach of contract action against the Pueblo. *Id.* at 31. The court therefore concluded that the Acting Assistant Secretary had failed to respect the limitations on Secretarial power worked by the amendments to Section 81 and "applied the old standard as if the statute had never been amended." *Id.* at 32. The court in fact found the Acting Assistant Secretary's determination "outmoded" and reminiscent of the treatment of Tribes under the earlier 19th century version of Section 81. *Id.* at 31. Rather than embracing the limited oversight authorized by the Contract Encouragement Act, the Court found that the Acting Assistant Secretary "ignored Congress's unambiguous intent to narrow the category of contracts to which Section 81 applies, and ignored the definitions and examples contained in the implementing Regulations." *Id.* at 33.

In *Guidiville Band of Pomo Indians v. NGV Gaming, Ltd.*, 2005 WL 5503031 (N.D. Cal. 2005), the United States District Court for the Northern District of California determined that Section 81 did apply to a set of agreements that authorized NGV, a non-Indian company, "to develop and construct a proposed gaming facility" on property that NGV would assist the tribe to identify and purchase and that the Tribe would then have taken into trust for it by the United States. 2005 WL 5503031 at *1. The court concluded that Section 81 approval was required because the agreements provided that:

> [T]he Tribe, so long as base rent for the gaming facility is payable will not "[s]ell,

> dispose of, lease, assign, sublet, transfer, mortgage or encumber (whether voluntarily or by operation of law) all or any part of its right or interest in or to the Trust Lands" without the prior written consent of NGV. Also, the Agreements grant NGV, its agents, employees, and independent contractors a right of entry, providing them with "complete and unrestricted access to the Indian trust lands for purposes of developing, installing and constructing the Structure."

Id. at *2 (citations and footnotes omitted; brackets in original). The court thus held the agreements encumbered tribal land.

While the *Guidiville* court may have applied Section 81 more broadly than the court in *GasPlus* – with considerably less analysis – the Intergovernmental Agreement between the Tribe and the Town of Mashpee is readily distinguishable from the *Guidiville* agreements. The *Guidiville* agreements effectively prohibited the Tribe from engaging in any substantial use of the property or from mortgaging or transferring any interest in the property without NGV's consent. These agreements thus imposed a very significant limitation on the Tribe's proprietary control over its lands and granted exclusive or nearly exclusive third party control over those lands. In contrast, the Intergovernmental Agreement does not restrict the Tribe's ownership rights in the land, once transferred, and does not preserve any of the Town's pre-transfer ownership rights, moreover, or give the town any right to possess, manage or use tribal lands.

We note that the district court in *Guidiville* also held that Section 81 applied to the agreements even though the lands on which the non-Indian entity would operate a gaming facility had not yet actually been conveyed into trust for the Tribe. *Id.* at *3. The *Guidiville* court relied upon Ninth Circuit precedent construing the pre-2000 Section 81 as applicable to a gaming facility construction contract. *Id.* (citing and quoting *A.K. Management Co. v. San Manuel Band*, 789 F.2d 785, 789 (9th Cir. 1986)). Although the district court acknowledged that Section 81 had been amended in 2000 and that *San Manuel* "dealt with a dispute over lands then held in trust for an Indian tribe," *id.*, it held that "the protective intentions of Congress" and "the federal government's longstanding policy of regulating Indian land transactions supports this reading of the applicability of the statute." *Id.* (footnotes omitted).

In our view, this portion of the *Guidiville* decision is highly questionable, particularly in light of the new Section 81's definition of "Indian lands," see p. 4-5, 6, *supra*; *see also* 25 U.S.C. § 81(a)(1), and unlikely to be followed except perhaps in cases dealing with gaming management contracts. *See* 25 U.S.C, § 2711 (requiring federal approval of such contracts). The *Guidiville* court's reliance on the "protective intentions of Congress," *id.* at *3, seems at odds with the Senate Report's view that "there is no justification" for the assumption that Tribes are unable to protect themselves from "the enterprise and fraud of the white man," S. Rep at 7-8. *See also GasPlus*, 510 F.Supp.2d at 25 ("Far from seeking to protect Indian tribes from third parties, the 2000 amendments to Section 81 were designed to encourage third parties to enter into business relationships with Indian tribes . . . ."). The *Guidiville* court's conclusion that Section 81 approval was required because of "[t]he federal government's longstanding policy of regulating

Indian land transactions . . . . ," *Guidiville*, 2005 WL 5503031 at *3, likewise appears inconsistent with Congress' intent to reduce federal oversight of contracts between tribes and third parties in the Contract Encouragement Act. S. Rep. at 8-9 (noting its intent to move away from the historic Section 81's susceptibility to the interpretation that "any contract that 'touches or concerns' Indian lands must be approved" and that under the amendments, "Section 81 will no longer apply to a broad range of commercial transactions."). In any event, because the Agreement clearly does not "encumber" tribal lands in the manner the agreements in *Guidiville* did, we conclude that the existing case law amply supports our conclusion that Section 81 does not apply to it.

Please do not hesitate to contact us if you have any questions concerning this opinion letter, or wish us to undertake any further analysis.

Sincerely,

/s/ Reid Peyton Chambers (JJT)

Reid Peyton Chambers
Jennifer J. Thomas

RPC/JJT:skk
Copies to:
David Pocknett, Vice-Chairman
Desire Hendricks-Moreno, Secretary
William A. McDermott, Esq.
Mr. Steve Graham

ATTACHMENT 5

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PETER G. ASHMAN (AK)*

*NOT ADMITTED IN D.C.

March 24, 2008

William A. McDermott, Esq.
Sullivan and McDermott
1988-1990 Centre Street
West Roxbury, MA 02132

Re: Approval of Tribe-Town Intergovernmental agreement under 25 U.S.C. § 81

Dear Bill:

As you directed, this letter summarizes our telephone conference on March 20 with Patrick Costello and the Perkins Coie attorneys who represent the Town concerning the status of their efforts to obtain Interior Department approval of the intergovernmental agreement under 25 U.S.C. § 81.

I have previously advised the Tribe that in our opinion Section 81 approval of this agreement is not required for two reasons. First, no lands covered by the agreement are within Section 81's definition of "Indian lands" because they are not held in trust by the United States or restricted against alienation by federal law. Second, nothing in the agreement "encumbers" any tribal lands, as that word is used in Section 81 and Interior's implementing regulations. See my attached letter dated February 29, 2008.

Nevertheless, despite our opinion, the Town's attorneys have submitted the agreement to the Interior Department and asked the Department whether Section 81 applies to it. In our telephone conference on March 20, the Town's attorneys told us that the Department believes the agreement does not come within Section 81 now, because none of the lands are presently held in trust or restricted against alienation. Thus, the Department's position is that it will not approve the agreement now and, as I understand it, would even state in writing that Section 81 approval is not presently required.

However, the Town's attorneys advised us that the Department also believes that at the time it takes the lands into trust in the future, the agreement will then require Section 81 approval.

As noted, in our opinion that is clearly wrong because the agreement does not encumber the lands for the reasons set forth in our February 29 letter. The Department apparently will not consider whether to approve the agreement under Section 81 until it decides to take the lands into trust. The Department's determination places the Tribe (or any similarly situated Tribe) in an untenable position, for it prevents any Tribe from acquiring lands from a third party that the Tribe wants to put into trust where the third party wishes to enter into a binding agreement with the Tribe prior to conveying the lands.

The Town's attorneys stated in our conference call that because of Interior's position, they will not recommend that the Town adopt this agreement at its April 7 Town meeting or agree to convey the three parcels (the Meetinghouse, Parsonage and Cemetery) to the Tribe as contemplated in the draft agreement that has been approved by the Tribal Council. As one possible way to address this problem, I suggested the draft agreement might be amended to provide that the Town convey a fee simple determinable to the Tribe in those three parcels, providing that the Tribe's fee simple title will revert to the Town if and only if the Interior Department gives notice of its decision to take those parcels into trust for the Tribe without simultaneously with that decision either (1) approving the agreement under 25 U.S.C. § 81, or (2) issuing a written determination that 25 U.S.C. § 81 does not apply to the agreement. Since the Department's regulations require at least thirty days prior notice of any decision to take any lands into trust, see 25 C.F.R. § 151.12(b), the reverter to the Town would either take effect or be extinguished before any lands are actually taken into trust status.

An alternative approach could be for the Tribe itself to seek a meeting with the highest officials in the Department – the Solicitor and Assistant Secretary for Indian Affairs – to discuss the untenable position the Department's determination places the Tribe in. If the Tribe takes this course, it should make the same presentation to relevant members of Congress as well.

Please let me know if you wish any further work from me on this problem or have any questions about this analysis.

Best personal regards,

Sincerely,

Reid

Reid Peyton Chambers

RPC:skk
Enclosure

ATTACHMENT 6

United States Department of the Interior
OFFICE OF THE SECRETARY
Washington, DC 20240

TAKE PRIDE IN AMERICA

APR 07 2008

Patrick Costello, Esq.
Louison, Costello, Condon & Pfaff, LLP
67 Batterymarch Street
Boston, MA 02110

Dear Mr. Costello:

I have received a copy of a proposed agreement between the Mashpee Wampanoag Tribe and the Town of Mashpee, Massachusetts. I am in agreement with the Solicitor's Office that approval under 25 U.S.C. § 81 will be required for this agreement only if the land involved is acquired in trust on behalf of the Tribe. *See* 25 C.F.R. §§ 84.003 (Section 81 applies to "tribal lands"); *see also id.* § 84.005 (Section 81 does not apply to those agreements the Secretary determines are not covered by the Act). The regulations implementing Section 81 prohibit the Department from providing approvals of agreements encumbering land before that land is Federally restricted against alienation or held by the United States in trust status. *See id.* § 84.005.

If the Department determines that it will acquire in trust the lands referenced in the proposed agreement, the Department will review an executed agreement for compliance with Section 81 at that time. The regulations implementing Section 81 state that such agreements will be approved *unless* the agreement violates Federal law, or fails to include or reference: 1) remedies in the event the contract or agreement is breached; 2) a tribal code, ordinance or ruling of a court of competent jurisdiction that discloses the right of the tribe to assert sovereign immunity as a defense in an action brought against the tribe; *or* 3) an express waiver of the right of the tribe to assert sovereign immunity as a defense in any action brought against the tribe, including a waiver that limits the nature of relief that may be provided or the jurisdiction of a court with respect to such an action. *See* 25 C.F.R. § 84.006.

Based on my preliminary review of the proposed agreement, it appears that it satisfies the foregoing standards, and would receive Departmental approval at the time the subject lands are acquired in trust.

Sincerely,

Carl J. Artman
Assistant Secretary – Indian Affairs

cc: Chairman Shawn Hendricks, Mashpee Wampanoag Tribe
William McDermott, Esq.

Appendix H-4
Attachment to Letter from Garvey Shubert Barer on behalf of Wampanoag Tribe of Gay Head (Aquinnah)

63 Fed. Reg 37906

In 1917, these cultural items were removed from a grave located southwest of New Albany, MS by Mr. Will Ticer. Mr. Ticer donated these items to the Mississippi State Geological Survey in 1923. The Geological Survey Collection eventually became part of the Anthropology Museum collections at the University of Mississippi.

Based on the cultural items, the burial from which they were removed has been determined to be Native American. The prescence of the 1801 Jefferson Peace Medal indicates the burial dates to the first quarter of the nineteenth century, before Removal. This area of northeastern Mississippi from which the cultural items were recovered during this period was occupied and controlled by the present day tribe now known as the Chickasaw Nation. These cultural items are consistent with present burial practices and ethnographic accounts detailing historic-period Chickasaw burial practices.

Officials of the Department of Sociology and Anthropology, University of Mississippi have determined that, pursuant to 43 CFR 10.2 (d)(2)(ii), these 1,340 cultural items are reasonably believed to have been placed with or near individual human remains at the time of death or later as part of the death rite or ceremony and are believed, by a preponderance of the evidence, to have been removed from a specific burial site of an Native American individual. Officials of the Department of Sociology and Anthropology, University of Mississippi have also determined that, pursuant to 43 CFR 10.2 (e), there is a relationship of shared group identity which can be reasonably traced between these items and the Chickasaw Nation.

This notice has been sent to officials of the Chickasaw Nation. Representatives of any other Indian tribe that believes itself to be culturally affiliated with these objects should contact Jay Johnson, Department of Sociology and Anthropology, University of Mississippi, Oxford, MS 38677 telephone (601) 232-7339 before August 13, 1998. Repatriation of these objects to the Chickasaw Nation may begin after that date if no additional claimants come forward.

Dated: June 29, 1998.

Francis P. McManamon,

Departmental Consulting Archeologist, Manager, Archeology and Ethnography.

[FR Doc. 98–18624 Filed 7–13–98; 8:45 am]

BILLING CODE 4310–70–F

DEPARTMENT OF THE INTERIOR

National Park Service

Notice of Intent to Repatriate Cultural Items From Taunton, MA in the Possession of the Robbins Museum of Archaeology, Middleboro, MA

AGENCY: National Park Service

ACTION: Notice

Notice is hereby given under the Native American Graves Protection and Repatriation Act, 43 CFR 10.10 (a)(3), of the intent to repatriate cultural items from Taunton, MA in the possession of the Robbins Museum of Archaeology, Middleboro, MA which meet the definition of "unassociated funerary objects" under Section 2 of the Act.

The cultural items consist of a small castellated pot and a copper or brass sheet metal spoon.

In 1952, Maurice Robbins removed these cultural items from a burial at the Wampanucket site, Taunton and Lakeville, MA. In 1985, Mr. Robbins donated these items to the Robbins Museum of Archaeology.

Based on continuities of material culture and manner of interments, the Wampanucket site has been identified as a Wampanoag cemetery area used from the early Woodland period into the early postcontact period. Consultation with representatives of the Wampanoag Repatriation Confederacy indicate these cultural items are consistent with traditional Wampanoag burial practices.

Officials of the Robbins Museum of Archaeology have determined that, pursuant to 43 CFR 10.2 (d)(2)(ii), these two cultural items are reasonably believed to have been placed with or near individual human remains at the time of death or later as part of the death rite or ceremony and are believed, by a preponderance of the evidence, to have been removed from a specific burial site of an Native American individual. Officials of the Robbins Museum of Archaeology have also determined that, pursuant to 43 CFR 10.2 (e), there is a relationship of shared group identity which can be reasonably traced between these items and the Wampanoag Repatriation Confederacy on behalf of the Wampanoag Tribe of Gay Head (Aquinnah).

This notice has been sent to officials of the Wampanoag Repatriation Confederacy on behalf of the Wampanoag Tribe of Gay Head (Aquinnah). Representatives of any other Indian tribe that believes itself to be culturally affiliated with these objects should contact John Pretola, c/o Robbins Museum of Archaeology, P.O. Box 700, Middleboro, MA 2346099005; telephone (508) 947099005 before August 13, 1998. Repatriation of these objects to the Wampanoag Repatriation Confederacy on behalf of the Wampanoag Tribe of Gay Head (Aquinnah) may begin after that date if no additional claimants come forward.

Dated: July 8, 1998.

Veletta Canouts,

Acting Departmental Consulting Archeologist,

Deputy Manager, Archeology and Ethnography Program.

[FR Doc. 98–18689 Filed 7–13–98; 8:45 am]

BILLING CODE 4310–70–F

DEPARTMENT OF THE INTERIOR

National Park Service

Notice of Intent to Repatriate Cultural Items from San Diego County, CA in the Possession of the San Diego Historical Society, San Diego, CA

AGENCY: National Park Service

ACTION: Notice

Notice is hereby given under the Native American Graves Protection and Repatriation Act, 43 CFR 10.10 (a)(3), of the intent to repatriate cultural items from San Diego County, CA in the possession of the San Diego Historical Society, San Diego, CA which meet the definition of "sacred object" under Section 2 of the Act.

The seven cultural items consist of one clay tube pipe (San Diego County Indian type), one dark brown ceramic pipe (San Diego County Indian type), one ceramic tube pipe (San Diego County Indian type), one ceramic "elbow" pipe (Sand Diego County Indian type), three steatite tube pipes, and one healing tube (San Diego Indian type).

In 1945, a healing tube was donated to the San Diego Historical Society by (?) Kimball. At an unknown date, the ceramic tube pipe was made by Julio Artega, and there is no other accession information. At an unknown date, three steatite tube pipes were found at Potrero, and there is no other accession information, but are noted in museum records as "Chumash" pipes. At an unknown date, a dark brown ceramic pipe was donated to the San Diego Historical Society. At an unknown date, a gray clay "elbow" pipe was donated to the San Diego Historical Society.

Although museum records state three of these cultural items are Chumash in origin, representatives of the Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation state that the appearance of all of these cultural items

appear to be of a Luiseno style, and have presented additional anthropological sources on Southern Californian Indian material culture. The Potrero site is a known sacred and ceremonial site used by the Pechanga Band, and the San Diego Historical Society has concluded the pipes from the Potrero site were misidentified as Chumash and are of Luiseno or Pechanga origin. Consultation with representatives of the Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation also indicates these items are needed by traditional religious leaders for the practice of traditional Native American religion by present-day adherents.

Officials of the San Diego Historical Society have determined that, pursuant to 43 CFR 10.2 (d)(3), these seven cultural items are specific ceremonial objects needed by traditional Native American religious leaders for the practice of traditional Native American religions by their present-day adherents. Officials of the San Diego Historical Society have also determined that, pursuant to 43 CFR 10.2 (e), there is a relationship of shared group identity which can be reasonably traced between these items and the Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation.

This notice has been sent to officials of the Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation, Barona Group of the Capitan Grande Band of Mission Indians, Campo Band of Mission Indians, Capitan Grande Band of Mission Indians, Cuapaipe Band of Mission Indians, Inaja Band of Mission Indians, Jamul Band of Mission Indians, La Jolla Band of Mission Indians, La Posta Band of Mission Indians, Los Coyotes Band of Mission Indians, Manzanita Band of Mission Indians, Mesa Grande Band of Mission Indians, Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation, Pauma Band of Mission Indians, Rincon Band of Mission Indians, San Pasqual Band of Mission Indians, Santa Ysabel Band of Mission Indians, Sycuan Band of Mission Indians, and Viejas Band of Mission Indians. Representatives of any other Indian tribe that believes itself to be culturally affiliated with these objects should contact Tammie Bennett, Registrar, San Diego Historical Society, P. O. Box 81825, San Diego, CA 92138; telephone (619) 232–6203, ext. 120, fax (619) 232–6297 before August 13, 1998. Repatriation of these objects to the Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation may begin after that date if no additional claimants come forward.

The National Park Service is not responsible for the determinations within this notice.

Dated: June 29, 1998.

Francis P. McManamon,

Departmental Consulting Archeologist, Manager, Archeology and Ethnography Program.

[FR Doc. 98–18623 Filed 7–13–98; 8:45 am]

BILLING CODE 4310–70–F

UNITED STATES INTERNATIONAL TRADE COMMISSION

Sunshine Act Meeting

TIME AND DATE: July 24, 1998 at 11:00 a.m.

PLACE: Room 101, 500 E Street S.W., Washington, DC 20436.

STATUS: Open to the public.

MATTERS TO BE CONSIDERED:

1. Agenda for future meeting: none.
2. Minutes.
3. Ratification List.
4. Inv. Nos. 701–TA–380–382 and 731–TA–797–804 (Preliminary) (Stainless Steel Sheet and Strip from France, Germany, Italy, Japan, the Republic of Korea, Mexico, Taiwan, and the United Kingdom)—briefing and vote.
5. Inv. Nos. 751–TA–17–20 (Titanium Sponge from Japan, Kazakstan, Russia, and Ukraine)—briefing and vote.
6. Outstanding action jackets: none.

The Commission has postponed the briefing and vote on Titanium Sponge from July 10, 1998. In accordance with Commission policy, subject matter listed above, not disposed of at the scheduled meeting, may be carried over to the agenda of the following meeting.

Issued: July 9, 1998.

By order of the Commission:

Donna R. Koehnke,

Secretary.

[FR Doc. 98–18840 Filed 7–10–98; 12:02 pm]

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DEPARTMENT OF LABOR

Occupational Safety and Health Administration

[Docket No. ICR–98–12]

Construction Posting Requirements—Emergency Numbers and Floor Load Limits; Information Collection Requirements

AGENCY: Occupational Safety and Health Administration, Labor.

ACTION: Notice; opportunity for public comment.

SUMMARY: The Department of Labor, as part of its continuing effort to reduce paperwork and information collection burdens, is conducting a preclearance consultation program to provide the general public and Federal agencies with an opportunity to comment on both current and proposed collections of information in accordance with the Paperwork Reduction Act of 1995 (44 U.S.C. 3506(c)(2)(A)). This program helps to ensure that reporting burden (time and financial resources) is minimized, collection materials are clearly understood, impact of collection requirements on respondents can be accurately assessed, and requested data can be provided in the desired format. Currently, the Occupational Safety and Health Administration is soliciting comments concerning the collection of information requirements in § 1926.50(f) and § 1926.250(a)(2).

The Agency is particularly interested in comments that:

- Evaluate whether the proposed collection of information is necessary for the proper performance of OSHA's responsibilities, including whether the information will have practical utility;
- Evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used;
- Enhance the quality, utility, and clarity of the information to be collected; and
- Minimize the burden of the collection of information on those who are to respond, including the use of appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology (for example, permitting electronic submissions of responses).

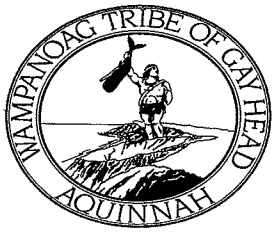
DATES: Written Comments must be submitted on or before September 14, 1998.

ADDRESSES: Comments are to be submitted to the Docket Office, Docket ICR–98–12, U.S. Department of Labor, Room N–2625, 200 Constitution Avenue, NW, Washington, DC 20210, (202) 219–7894. Written comments limited to 10 pages or less may be transmitted by facsimile to (202) 219–5046.

FOR FURTHER INFORMATION CONTACT: Mr. Laurence Davey, Directorate of Construction, Occupational Safety and Health Administration, U.S. Department of Labor, Room N3621, 200 Constitution Avenue, NW., Washington, DC 20210,

WAMPANAOG TRIBE OF GAY HEAD (AQUINNAH)

TRIBAL HISTORIC PRESERVATION OFFICE (THPO) ORDINANCE MARCH 6, 2004



Wampanoag Tribe of Gay Head (Aquinnah)

TRIBAL HISTORIC PRESERVATION OFFICE (THPO) ORDINANCE

Enacted By: Resolution 2004-06

March 6, 2004

Summary. This ordinance establishes the Tribal Historic Preservation Office of the Wampanoag Tribe of Gay Head (Aquinnah); defines the Office's powers and duties; delegates authority to the Office and to the Officer as head of the Office, including authority to develop rules to carry out this Ordinance; designates the Aquinnah Wampanoag Tribal Historic Preservation Officer for purposes of the National Historic Preservation Act and the Repatriation Officer for the purposes of the Native Graves Protection and Repatriation Act and the Massachusetts Unmarked Burial Act; directs the Office to establish a Aquinnah Wampanoag Register of Heritage Places; establishes a cultural resources revenue account; establishes a clearance requirement for undertakings that may affect cultural resources on Aquinnah Wampanoag Tribal lands; prohibits certain kinds of activities that may affect cultural resources; authorizes the establishment of a permit program to control activities that are prohibited unless a permit has been issued; authorizes civil and criminal penalties for the enforcement of this Ordinance; authorizes administrative appeals procedures and judicial review; and provides a limited waiver of sovereign immunity authorizing actions with Tribal Council (Tribal Court when established) for injunctive relief (but not for money damages) to ensure that Tribal agencies and enterprises comply with the procedural requirements of the Ordinance.

WAMPANOAG TRIBE OF GAY HEAD (AQUINNAH)
TRIBAL HISTORIC PRESERVATION (THPO) ORDINANCE

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PART 1. GENERAL PROVISIONS

Section 101. Title and Summary

(a) This Ordinance may be cited as the "Tribal Historic Preservation Ordinance."

(b) This ordinance establishes the Tribal Historic Preservation Office (THPO) of the Wampanoag Tribe of Gay Head (Aquinnah); defines the Office's powers and duties; delegates authority to the THPO and to the Officer as head of the Office; establishes the Cultural and Historic Commission (CHC) with the authority to develop rules to carry out this Ordinance; designates the Aquinnah Wampanoag Tribal Preservation Officer (THPO) for purposes of the National Historic Preservation Act (NHPA) and the Repatriation Officer for the purposes of the Native American Graves Protection and Repatriation Act (NAGPRA) and the Massachusetts Unmarked Burial Act; directs the Office to establish an Aquinnah Wampanoag Register of Heritage Places; establishes a cultural resources revenue account; prohibits certain kinds of activities that may affect cultural resources; authorizes the establishment of a permit program to control activities that are prohibited unless a permit has been issued; authorizes civil and criminal penalties for the enforcement of this Ordinance; authorizes administrative appeals procedures and judicial review; and provides a limited waiver of sovereign immunity authorizing actions in Tribal Council (Tribal Court when established) for injunctive relief (but not for money damages) to ensure that Tribal agencies and enterprises comply with the procedural requirements of the Ordinance.

Section 102. Findings

The Tribal Council of the WTGH (A) finds and declares that:

(a) The spirit and direction of the WTGH (A) [herein after referred to as WTGH (A)] are founded upon and reflected in its cultural heritage;

(b) The cultural heritage of the WTGH (A) must be preserved as a living part of community life and development and of the spiritual and religious life of the WTGH (A);

(c) Many cultural resources which hold significance for the WTGH (A), both within the boundaries of the Aquinnah Wampanoag tribal lands and on other lands traditionally used by the Tribe, have been damaged or destroyed, sometimes inadvertently and sometimes intentionally;

(d) Preserving and caring for cultural resources will provide spiritual, cultural, educational, aesthetic, inspirational, social, environmental and economic benefits for current and future generations of the WTGH (A);

(e) Present governmental programs, tribal and non-tribal, to preserve the WTGH (A)'s cultural resources are inadequate and do not ensure that future generations will have a genuine opportunity to appreciate and enjoy the rich cultural resources of the WTGH (A) in light of the increasing pace of activities and projects that can adversely affect cultural resources (such as economic development projects, sanitation and public health developments, road building and housing construction);

(f) Increased knowledge about Aquinnah Wampanoag cultural resources, along with the establishment of better means of identifying and fostering the preservation of cultural resources, will improve the planning processes used by tribal, federal, state and other government agencies and will facilitate the expeditious implementation of economic development projects;

(h) Although the federal and state government agencies have played major roles in cultural resource preservation, and both these levels of government must continue to play their proper roles, it is essential that the WTGH(A) expand and accelerate its cultural resource preservation programs and activities;

(i) The Tribal Council possesses the authority to enact legislation to establish programs to preserve cultural resources as an aspect of the inherent sovereignty of the WTGH (A), in accordance with the Constitution of the WTGH (A);

(j) The inherent sovereignty of Indian tribes to enact legislation for the preservation of cultural resources is recognized in federal law, including statutes such as the Archaeological Resources Protection Act, National Historic Preservation Act, and Native American Graves Protection and Repatriation Act;

(k) Under international human rights law, the WTGH (A) has the right to maintain its cultural integrity, and the enactment of tribal legislation to preserve cultural resources is a critical step that the Tribal Council can take to maintain the cultural integrity of the WTGH (A).

Section 103. Policy

It shall be the policy of the WTGH (A) to:

(a) Recognize, support, and perpetuate the traditional stewardship by Aquinnah Wampanoag people of culturally significant resources that are located on lands traditionally used by Aquinnah Wampanoag people but not currently within the territorial jurisdiction of the WTGH (A);

(b) Preserve and care for cultural resources that are within the jurisdiction or control of the WTGH (A) in a spirit of stewardship and for the inspiration of present and future generations;

(c) Encourage the preservation and use of historic buildings and structures located within the Aquinnah Wampanoag Tribal Lands;

(d) With respect to cultural resources that are not within the jurisdiction or control of the WTGH(A) but which are significant for Aquinnah Wampanoag cultural heritage, to encourage those governmental agencies that do have jurisdiction and other entities that have control to manage such resources in a spirit of stewardship and for the inspiration of present and future generations of Aquinnah Wampanoag and non-Aquinnah Wampanoag people;

(e) Preserve and manage cultural resources in ways that contribute to meeting the spiritual, cultural, educational, aesthetic, inspirational, social, environmental, economic and other needs of present and future generations;

(f) Provide leadership and technical assistance in the preservation, protection, and conservation of cultural resources by building an exemplary cultural resources management program, by sponsoring educational programs for the general public and training programs for tribal employees, by consulting and cooperating with other governmental agencies, and by making contributions to academic journals and other appropriate publications;

(g) Cooperate with other Indian tribes, federal and state agencies, private organizations and individuals in the preservation and management of cultural resources;

Section 104. Definitions

The following definitions apply for purposes of this Ordinance and rules issued by the CHC to carry out this Ordinance. Rules issued by the CHC may clarify the definitions in this section and may include definitions for additional terms, *provided* that any such additional definitions shall be generally consistent with the use of such terms in federal cultural resources law and *provided* that any intentional minor differences in the use of such terms shall be explained in the rules. Additional terms shall be recommended to Tribal Council for adoption into the definitions of this Ordinance.

(a) "Archaeological resources" means any material remains of human life or activities which are at least 100 years of age and which are of archaeological interest, as further clarified in federal regulations (43 C.F.R. § 7.3(a)); *provided*, for purposes of this Ordinance the term does not include human remains and funerary objects.

(b) "Cultural Resource" means any product of human activity or any object or place given significance by human action or belief. Places that may be cultural resources include building and other structures, landforms, archaeological sites, traditional cultural properties, and districts that are eligible, or potentially eligible, for listing on the Aquinnah Wampanoag Register of Heritage Places or the National Register of Historic Places. Objects that may be cultural resources include artifacts and other physical remains of human activity, natural objects given significance by human action or belief, human remains and "cultural items" as defined in the Native American Graves Protection and Repatriation Act (funerary objects, sacred objects and objects of cultural patrimony), and archaeological resources. Objects may be eligible for the Aquinnah Wampanoag Register of Heritage Places or the National Register of Historic Places if they are in some way connected to a specific place.

(c) "Cultural and Historic Commission" or "CHC" " means the commission established pursuant to Section 207 of this Ordinance.

(d) "Aquinnah Wampanoag Register" means the Aquinnah Wampanoag Register of Heritage Places established pursuant to Section 301 of this Ordinance.

(e) "Wampanoag traditional ancestral lands" means all lands historically or traditionally used by the Wampanoag people, *except* for those lands that are currently within the boundaries of the Aquinnah Wampanoag Tribal Lands or otherwise included in the term "Aquinnah Wampanoag tribal lands" as used in this Ordinance.

(f) "Aquinnah Wampanoag tribal lands" means all lands over which the WTGH (A) has jurisdiction, including all land within the exterior boundaries of the Aquinnah Wampanoag Tribal Lands and all other Aquinnah Wampanoag Indian country, as that term is defined in 18 U.S.C. § 1151.

(g) "Heritage resource" or "heritage property" means any cultural resource or property that has been determined eligible for listing in the Aquinnah Wampanoag Register of Heritage Places.

(h) "Indian" or "Indian person" mean any enrolled member of a federally recognized Indian tribe and any other person who is considered an Indian for purposes of the Indian Civil Rights Act (25 U.S.C. § 1301(4)) and criminal jurisdiction under the federal Major Crimes Act (18 U.S.C. § 1153).

(i) "National Register" means the National Register of Historic Places established pursuant to the National Historic Preservation Act and administered by the National Park Service (36 C.F.R. parts 60, 63).

(j) "Repatriation" means the expeditious return to the WTGH (A) of human remains, associated funerary objects, objects of cultural patrimony, and sacred objects and other objects possessed or controlled by persons and entities other than the Tribe and its members pursuant to the Native Graves Protection and Repatriation Act (NAGPRA). In the event that the WTGH (A) comes into possession or control of items to which other tribes or individuals have rights of ownership or control, the term also means the expeditious return of such items to such tribes or persons.

(k) "Repatriation Officer" means the officer charged under tribal law with the responsibility for administering the tribal repatriation program.

(l) "Responsible agency official" means the official of a federal, tribal or state agency who has decision making authority over a particular undertaking proposed, or under consideration, by such an agency.

(m) "Responsible person" means the individual in private capacity or official in a non-governmental organization who has decision-making authority over a particular undertaking.

(n) "State Historic Preservation Officer" or "SHPO" means the officer or state government agency charged under state law with responsibility for administering a state historic preservation program.

(o) "Traditional Cultural Place" or "Traditional Cultural Property" means, as defined by the National Park Service in National Register Bulletin 38, a place that is eligible for the National Register because of its association with cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining the continuing cultural identity of the community. As used in this Ordinance this term also includes such a place if it has been determined eligible for the Aquinnah Wampanoag Register regardless of whether or not it has been determined eligible for the National Register.

(p) "Tribal Historic Preservation Office" or "Officer" means the officer charged under Tribal law with the responsibility for administering the Tribal Historic Preservation Program.

(q) "Tribal Historic Preservation Officer" or "Office" means the officer or Tribal program charged under Tribal law with the responsibility for administering the Tribal Historic Preservation Program.

(r) "Tribal Land Use Commission" or "LUC" means the Commission established pursuant to the Aquinnah Wampanoag Land Use Ordinance.

(s) "Undertaking" means:

(1) "undertaking" as defined in the National Historic Preservation Act (16 U.S.C. § 470w(7)): "a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including:

"(A) those carried out by or on behalf of a Federal agency;

"(B) those carried out with Federal financial assistance;
"(C) those requiring a Federal permit, license, or approval; and
"(D) those subject to State or local regulation administered pursuant to a delegation or approval by a Federal agency"; and

(2) Any project, activity or program carried out under the authority of, or with permission from, an agency, enterprise or other entity created by the WTGH (A), including any "development" for which a permit is required under the Aquinnah Wampanoag Land Use Ordinance, regardless of whether or not there is federal agency involvement sufficient to bring the project, activity or program within the coverage of paragraph (1) of this definition, *provided* that the Officer, through the issuance of rules by the CHC, may establish procedures to avoid the application of this term to projects, activities and programs that do not have the potential to result in changes in the character and use of cultural resources.

(3) The Officer, through the issuance of rules by the CHC, may establish that certain kinds of actions are "exempted categories" which generally shall not be treated as "undertakings" for purposes of this Ordinance based on a determination that the potential effects on cultural resources of undertakings within any such category are foreseeable and likely to be minimal. The CHC's rules for exempted categories shall include a procedure for determining, for a particular action that fits within an exempted category, whether the particular action may affect cultural resources, and, if such a determination is made, the action shall be treated as an "undertaking." Actions that would otherwise be treated as "undertakings" under paragraph (1) of this definition may be included in exempted categories only to the extent that the Advisory Council on Historic Preservation authorizes such treatment, through the Council's regulations or pursuant to an agreement between the Advisory Council and WTGH (A).

Section 105. Severability

If any portion of this Ordinance or the application thereof to any person, court or circumstances is held invalid by an Aquinnah Wampanoag tribal court or federal court, the invalidity shall not affect other provisions of this Ordinance which can be given effect without the invalid provisions or application and to this end, the provisions of this Ordinance are severable.

Section 106. Effective Dates

The permit requirements in Part 3 of this Ordinance become effective on the date that rules to establish a permit program, issued pursuant to Section 208, become effective. All other provisions of this Ordinance become effective upon enactment by the Tribal Council.

PART 2. TRIBAL HISTORIC PRESERVATION OFFICE ADMINISTRATION

Section 201. Tribal Historic Preservation Office

(a) *Establishment.* The Tribal Historic Preservation Office (Office) is hereby established.

(b) *Mission.* The Office shall be the WTGH (A)'s lead agency for the identification, protection, preservation and management of cultural resources within Aquinnah Wampanoag tribal lands and Wampanoag traditional ancestral lands.

(c) *Programs.* The Office shall develop and administer all programs necessary to achieve the purposes of this Ordinance, consistent with direction from the Cultural and Historical Commission and Tribal Council and WTGH (A) Administration, including programs to:

(1) Advise the Aquinnah Wampanoag Tribal Council, the Cultural and Historic Commission, and other departments, programs, authorities, enterprises, and other instrumentalities of the WTGH (A), federal, state and local government agencies, private organizations and individuals on matters pertaining to the cultural resources in order to achieve the purposes of this Ordinance on Aquinnah Wampanoag tribal lands and on Wampanoag traditional ancestral lands;

(2) Assume functions of the State Historic Preservation Officer on Aquinnah Wampanoag tribal lands as provided by agreement with the National Park Service;

(3) Represent the Tribe in consultations with federal agencies and the SHPO for cultural resources located on Wampanoag traditional ancestral lands;

(4) Recommend to Tribal Council interagency memoranda of agreement (MOAs) and programmatic agreements (PAs) to facilitate and advance the purposes of this Ordinance;

(5) Compile, update and maintain a cultural resources data base for Aquinnah Wampanoag Tribal lands and Wampanoag traditional ancestral lands, including but not limited to Wampanoag Confederation's Repatriation database and the development of the Aquinnah Wampanoag Register of Heritage Places and;

(6) Provide appropriate education to the public (Aquinnah Wampanoag and non-tribal members) regarding the importance of preservation, protection and management of the cultural resources on Aquinnah Wampanoag Tribal lands and Wampanoag traditional ancestral lands;

(7) Protect Aquinnah Wampanoag cultural resources on Aquinnah Wampanoag tribal lands by enforcing the prohibitions and administering the permit requirements of Part 3 of this Ordinance;

(8) Support the Repatriation Officer in seeking the repatriation of human remains and cultural items from federal agencies and "museums" (as that term is defined in the Native American Graves Protection and Repatriation Act) and other persons and establish procedures, in consultation with the CHC, for determining the appropriate disposition of repatriated items;

(9) Manage collections of cultural resources excavated from Aquinnah Wampanoag tribal lands and Wampanoag traditional ancestral lands; and

(10) Prepare a strategic plan for Cultural Resources and Historic Preservation on behalf of the WTGH (A) and provide a copy of this Plan to the CHC for recommendation to the Tribal Council. The Office shall submit a report to General Membership on an annual basis, including a brief report summarizing the Office's accomplishments during the preceding year and issues that merit consideration by the CHC, the Tribal Council, and the General Membership

(d) *Appropriations and Funding.* This Ordinance authorizes the Office to seek and obtain the funds necessary to support the Office's programs from all appropriate sources, and to establish THPO Revenue

Account(s) pursuant to Section 204 of this Ordinance. Under the supervision of the fiscal accounting department of the WTGH (A), the Officer will manage and supervise the Office in the expenditure of funds to achieve its mission and carry programs under this ordinance.

Section 202. Officer

(a) *Executive Direction.* The Office shall be supervised by the Officer (hereinafter referred to as "Officer"), who shall be hired and compensated in accordance with WTGH (A) Tribal Personnel Policies and Procedures. The Officer shall report directly to the Cultural & Historic Commission or their designee

(b) *Responsibilities.* The Officer shall have the overall responsibility for carrying out this Ordinance. Specific responsibilities of the Officer shall include, but not be limited to, the following:

(1) Serve as the Officer for purposes of the National Historic Preservation Act;

(2) Serve as the agent of the WTGH (A) for receiving notice to the WTGH (A) in matters relating to cultural resources.

(3) Consult, coordinate, and negotiate agreements with other Aquinnah Wampanoag tribal agencies and entities, and with state agencies, federal agencies, and agencies of other Indian tribes regarding cultural resources;

(4) Serve as a representative of the Office and, if appropriate, the WTGH (A) in any action in any court or any administrative proceeding involving the validity or enforcement of this Ordinance or involving other legal matters relating to cultural resources;

(5) Review undertakings and administer a permit program pursuant to Part 3 of this Ordinance;

(6) Develop, in consultation with the Cultural & Historic Commission, plans and programs to protect and preserve the cultural resources of the WTGH (A);

(7) Seek funding from appropriate sources with the approval of the CHC and negotiate and administer grant and contractual agreements to ensure that the obligations assumed by the Office in such agreements are carried out;

(8) Develop a program to oversee the quality of cultural resources work carried out pursuant to permits issued under Part 3 of this Ordinance and to monitor the quality of similar work carried out on Wampanoag traditional ancestral lands pursuant to permitting authority of other governmental agencies;

(9) Develop and maintain Office archives containing records, publications, and other material relating the cultural heritage of the WTGH (A); and

(10) Develop rules and other formal policy statements and guidance documents for adoption by the CHC, to carry out this Ordinance, in accordance with Section 208.

Section 203. Delegation of Authority

The Tribal Council hereby delegates to the Office and the Officer the authority necessary to carry out this Ordinance, subject to such review and oversight of the Cultural and Historic Commission.

Section 204. THPO Revenue Account

The Office is authorized, in cooperation with the WTGH (A) Finance department, to establish THPO Revenue Account(s). All revenue from sources such as contracts, cooperative agreements, and grants shall be deposited into this account for disposition in accordance with the terms of such contracts, cooperative agreements, and grants. Revenue from fees, fines, civil penalties, civil forfeitures and other sources under this Ordinance shall be deposited into this account(s) and shall be expended in accordance with Aquinnah Wampanoag budgetary procedures to help achieve the purposes of this Ordinance.

Section 205. Cultural Resource Monitoring Branch

The Officer is authorized to administer a Cultural Resource Monitoring Branch within the Office to provide or arrange for archaeological services for other departments of tribal government, tribal enterprises, and the private sector and to charge reasonable fees to cover the costs of providing such services. If the Officer and Aquinnah Cultural Center Board are in agreement, the tribal chartered Aquinnah Cultural Center, Inc. may act as the non-profit corporation for the purposes of providing archaeological services. Otherwise if, in the Officer's judgment, it would be preferable for the Tribal Council to charter a non-profit tribal corporation to provide archaeological services, the Officer shall be authorized to act as the corporation's executive Officer.

Section 206. Aquinnah Cultural Center

(a) The Officer is authorized to collaborate with the Aquinnah Cultural Center Board of Directors in the establishment and the ongoing operations of the Aquinnah Cultural Center (ACC).

Section 207. Cultural and Historic Commission

(a) In carrying out their responsibilities under this Ordinance, the Officer, Repatriation Officer and the employees of the Office shall be guided by the wisdom and expertise of the CHC.

(b) The CHC shall act as the tribal historic preservation and repatriation review board and is authorized by the Tribal Council to assist the Officer with the identification, evaluation and protection of the tribal land with important historic and archaeological resources under the National Historic Preservation Act, as well as assist the Repatriation Officer in the repatriation of human remains, associated funerary objects, sacred objects, and objects of cultural patrimony under the Native Graves Protection and Repatriation Act.

(c) The Commission shall be composed of no more than five (5) Aquinnah Wampanoag tribal members, including, but not limited to, the Tribal Chief and Medicine Man who are chosen for life in the traditional Aquinnah Wampanoag manner and serve on the Commission indefinitely, as well as a representative from Tribal Council and the Aquinnah Cultural Center Board of Directors who shall serve for the duration of their appointed term, as well as a tribal member at large appointed by the Tribal Council for a three year term. If necessary to carry out this Ordinance and subject to the signing of a mutual agreement, more than one member of the ACC Board of Directors may serve on the Cultural and Historical Commission. The CHC reports to the Tribal Council.

The Medicine Man/ Chief/ elders are the WTGH (A)'s traditional cultural authorities who provide advice to the CHC. In addition the CHC shall work with professionally qualified consultants to obtain advice when making decisions about certain cultural/ historical resource in accordance with the activity profiles and performance standards set forth in Appendix B.

Upon enactment of this Ordinance the Officer, in consultation with the members of the CHC described in paragraph (e) of this section, shall develop:

(1) A Policy Statement on the Roles and Responsibilities of the CHC; and

(2) A Procedure for Appointments to the CHC, if not already established through by-law.

(d) In addition to such other roles and responsibilities as the Tribal Council determines are appropriate for the CHC. The CHC shall perform a role similar to that performed by a State Review Board under regulations issued by the National Park Service regarding nominations of properties to the National Register of Historic Places. (36 C.F.R. parts 60, 61).

(e) The Policy Statement and Procedure for Appointments shall take effect upon approval by the Tribal Council.

(f) The Policy Statement may include provisions for the payment of compensation to the members of the CHC and Repatriation Officer for their service to the WTGH (A) in this capacity.

Section 208. Repatriation Officer

(a) *Repatriation Officer.* The Tribal Council shall appoint a qualified enrolled tribal member to serve as the Aquinnah Wampanoag Repatriation Officer for the proposes of the Native American Graves Protection and Repatriation Act (NAGPRA) and the Massachusetts Unmarked Burial Law, Massachusetts General Laws (Ch. 659 of the Acts of 1983 and Ch. 386 of the Acts of 1989). The Repatriation Officer shall report directly to the Officer.

(b) *Responsibilities.* The Repatriation Officer shall have the overall responsibility for carrying out duties under the Native American Graves Protection and Repatriation Act (NAGPRA), and the Massachusetts Unmarked Burial Law, but not be limited to, the following:

(1) Provide an authoritative source of tribal law and custom relating to repatriation;

(2) Consult with federal agencies and museums;

(3) Present repatriation requests to federal agencies and museums; and

(4) Act on all tribal repatriation matters and act as legal signatory.

Section 209. Rulemaking and Other Policy Documents

(a) *Rulemaking Authority.* The CHC is authorized to issue rules to carry out this Ordinance. For some provisions of this Ordinance, the issuance of rules is mandatory: the Ordinance expressly requires the CHC to issue rules, and those provisions cannot be carried out until rules have been issued. In addition, the CHC is authorized to issue rules to carry out other provisions of this Ordinance if, in the CHC's judgment, rules would be advisable to help clarify the Ordinance and to provide guidance to the affected public.

(b) *Rulemaking Procedure.* The development of rules is intended to be a process in which persons whose interests will be affected by the rules have an opportunity to understand how the rules will affect their

interests and to make their views known. The Officer is responsible for ensuring that, unless the expedited procedure in paragraph (d) of this section applies, the following steps are taken:

(1) A proposed rule shall be made available to the public, including an explanation of the rule in plain language. A notice of the availability of the proposed rule shall be posted at the offices of the Tribal Council and may be published in the tribal newspaper and mailed to persons known to be interested in the rule.

(2) A comment period of forty-five (45) days shall be provided during which interested persons may file written comments on the proposed rule.

(3) A final rule shall be made available to the public, which shall include a summary of comments received and a brief discussion of the Officer's response to comments received, although the Officer need not respond to every point raised in the comments. A notice of the availability of the final rule shall be posted at the office of the Tribal Council.

(4) A final rule shall be placed on the agenda for a scheduled meeting of the Tribal Council and shall become effective upon approval by the Tribal Council The Tribal Council shall act in a timely fashion when making a decision on a final rule

(c) *Additional Procedures for Rulemaking.* The Officer may use additional methods to inform the public and seek the views of concerned persons, such as informal community meetings and more formal public hearings. If the Council, through resolution or ordinance, imposes additional procedural requirements that clearly are intended to apply to rulemaking under this Ordinance, the Officer shall comply with such requirements.

(d) *Procedures, Standards, Guidelines and Policy Statements.* The Officer may develop and carry out various kinds of policy and guidance documents other than rules that the Officer deems necessary or advisable to carry out this Ordinance, upon review and adoption by the Cultural and Historical Commission. Such document may include procedures, standards, guidelines and policy statements. Unless specifically required by this Ordinance or by other formal action of the Tribal Council, such documents generally do not require Tribal Council approval before taking effect. The Officer shall provide a copy of any such document to the Tribal Council.

Section 210. Hearings

The Officer and the CHC are authorized to hold legislative hearings as part of the rulemaking process, administrative hearings on permit applications and appeals, and enforcement hearings on alleged violations of this Ordinance.

(a) *Rulemaking hearings.* In developing rules, the CHC may hold a hearing in which Aquinnah Wampanoag tribal members and others who may be affected by rules to be developed are given the opportunity to express their views. Notice of rule-making hearings shall be provided at least thirty (30) days prior to the date of the hearing and the text of the proposed rules, with explanatory materials, also shall be made available to the public at least thirty (30) days prior to the date of the hearing.

(b) *Administrative hearings.* When considering whether to approve an application for a permit pursuant to Part 3 of this Ordinance, the Officer generally will make the initial decision based upon the written application. The Officer is authorized to hold administrative hearings to gather information to be used in making the initial permit decision. The CHC shall hold an administrative hearing when an affected party has requested review of a permit decision pursuant to Section 502 of this Ordinance. In an administrative hearing, the burden is on the applicant to demonstrate to the CHC that the issuance of a permit would be consistent with the Ordinance and the Office's rules. A written transcript shall not be required, but the applicant shall be entitled to a written decision. The Officer shall issue rules establishing procedures for administrative hearings adopted by the CHC.

Section 211. Public Meetings

The Officer is authorized to hold public meetings whenever doing so would help carry out the policies of this Ordinance. Public meetings generally are less formal than public hearings and do not require the preparation of a transcript or other record. Public meetings can be used to encourage community involvement in the rulemaking process or to inform the public about the Aquinnah Wampanoag cultural heritage resources program or for any other worthwhile purpose in the judgment of the Officer.

PART 3. PROTECTION OF CULTURAL HERITAGE RESOURCES

Section 301. Aquinnah Wampanoag Register of Heritage Places

(a) *Creation of the Register.* The Officer shall create, expand, maintain and administer an Aquinnah Wampanoag Tribal Register of Heritage Places (hereinafter referred to as the "Aquinnah Wampanoag Register") comprising places, buildings, districts, objects, and structures significant in Aquinnah Wampanoag history, culture, archaeology, engineering, and architecture in consultation with the CHC. The Officer shall issue rules to establish criteria for eligibility and procedures for determining eligibility and nominating places to be listed on the Aquinnah Wampanoag Register adopted by the CHC. Eligibility for the Aquinnah Wampanoag Register shall not be limited to places that are located on Aquinnah Wampanoag tribal lands but, rather, may also include places located on Aquinnah Wampanoag traditional ancestral lands.

(b) *Inventory, Evaluation, and Registration.* The Officer shall establish a program to locate, inventory and evaluate cultural resources on Aquinnah Wampanoag tribal lands and Aquinnah Wampanoag traditional ancestral lands. In accordance with rules issued pursuant to paragraph (a) of this Section, upon a determination that a place is eligible for the Aquinnah Wampanoag Register, the Officer may formally add the place to the Register or the Officer may maintain a separate listing of places that have been determined eligible but have not been formally listed.

(c) *Cultural and Historic Commission.* The rules issued by the Officer pursuant to paragraph (b) shall include a procedure through which the Officer shall consult with the CHC in determining whether any particular place is eligible for the Aquinnah Wampanoag Register and, if it is eligible, whether or not it should be formally listed. The consultations leading up to such determinations may be closed to the public if, in the judgment of the Officer or the CHC, confidentiality is advisable to protect the cultural resources at issue and the traditional uses of such resources by tribal members, *provided* that members of the Tribal Council and persons designated by them may participate in such consultations. In the event of a disagreement between the Officer and the CHC, the Officer shall defer to the judgment of the CHC and issue the CHC's determination for the Office.

(d) *Appeals.* A determination by the Officer on the eligibility of a place for the Aquinnah Wampanoag Register may be appealed pursuant to Section 503.

Section 302. National Register of Historic Places

(a) *Inventory, Evaluation, and Nomination.* The Officer shall establish a program to locate, inventory and evaluate cultural resources on Aquinnah Wampanoag tribal lands and Aquinnah Wampanoag traditional ancestral lands that appear to be eligible for the National Register of Historic Places, and to determine whether such properties should be formally nominated to the National Register in consultation with the CHC. In establishing and carrying out this program, the Officer shall consider (1) places that are eligible for both the Aquinnah Wampanoag Register and the National Register, and (2) places that are eligible for the National Register but which are not significant in Aquinnah Wampanoag history, culture, archaeology, engineering, and architecture and thus are not eligible for the Aquinnah Wampanoag Register.

(b) *Cultural and Historic Commission.* The program established by the Officer shall include a role for the CHC similar to that performed by State Review Boards in regulations issued by the National Park Service governing nominations to the National Register (36 C.F.R. part 60).

(c) *Appeals.* Determinations by the Officer to nominate a property to the National Register, or not to nominate a property, may be appealed to the Keeper of the National Register in accordance with regulations issued by the National Park Service (36 C.F.R. part 60). Such determinations shall *not* be subject to appeal or judicial review pursuant to Sections 503 and 504 of this Ordinance.

Section 303. Clearance Requirement for Undertakings

(a) *Clearance Requirement.* Before carrying out any undertaking that may affect cultural resources located on Aquinnah Wampanoag tribal lands, the responsible agency official or responsible person proposing the undertaking must provide the Officer with a reasonable opportunity to review the undertaking and determine the effects the undertaking is likely to have on cultural properties. The undertaking shall not proceed unless and until the Officer has given the responsible agency official or responsible person written clearance to proceed. Such written clearance may include mitigation measures, which shall be binding on the responsible agency official or responsible person.

(b) *Relationship to Land Use Ordinance.* If the undertaking constitutes "development" under the Aquinnah Wampanoag Land Use Ordinance, the responsible agency or responsible person proposing the undertaking must apply to the Tribal Land Use Commission (LUC) for a permit, pursuant to the requirements of the ordinance. The LUC will consult with the Officer regarding the effects the undertaking is likely to have on cultural resources and will include in the permit any conditions required by the Officer.

(c) *Discovery Situations for Development under a LUC Permit.* If cultural resources are discovered during the course of development pursuant to a LUC permit, the LUC will consult with the Officer regarding such cultural resources and will include any modification to the permit required by the Officer. Depending on the likely effects that the undertaking may have on such cultural resources, the LUC may consider suspending or revoking the permit, subject to the procedural protections of notice and hearing provided in Section 309 of this Ordinance and the judicial review provision of Section 503.

(d) *Procedure.* The Officer is authorized to issue rules to carry out the consultation requirement of this Section adopted by the CHC. In these rules the Officer may provide that certain kinds of activities that normally do not adversely affect cultural resources may be excluded from the clearance requirement or may be addressed through programmatic agreements with responsible agencies. In the absence of rules issued by the Officer, the procedure for conducting this consultation shall follow the procedure set out in the regulations issued by the Advisory Council on Historic Preservation for the Section 106 consultation process under the National Historic Preservation Act (36 C.F.R. part 800), with the Officer performing the role of the SHPO,

provided, that, as provided in paragraph (a) of this Section, unless and until the Officer issues clearance, the responsible agency official or responsible person cannot lawfully proceed with an undertaking.

(e) *Relationship to Permit Requirements*. The clearance requirement established by this Section is in addition to any permit requirements pursuant to Section 305 of this Ordinance, or pursuant to the Aquinnah Wampanoag Land Use Ordinance, that may also apply. For many kinds of undertakings it may be necessary to obtain one or more permits under Section 305 in order to gather sufficient information to make final plans for the undertaking and/or to adequately mitigate adverse effects on cultural resources prior to seeking clearance from the Officer for the undertaking itself.

(f) *Hearings and Appeals*. If the Officer denies clearance for an undertaking, the person or agency proposing the undertaking may request a hearing pursuant to Section 502 of this Ordinance. Any final decision made by the Officer is subject to judicial review pursuant to Section 503 of this Ordinance.

Section 304. Prohibited Activities

The prohibitions in this Section apply to cultural resources located on or within Aquinnah Wampanoag tribal lands.

(a) No person or agency shall carry out an undertaking without first obtaining clearance from the Officer, or a permit from the Land Use Commission, as the case may be, pursuant to Section 303 of this Ordinance.

(b) No person shall disturb, take, excavate, remove, damage, destroy, desecrate or alter any cultural resource or conduct any investigation relating to any cultural resource, or make an exploratory excavation to determine the presence of any cultural resource without first obtaining a permit form the Officer pursuant to this Ordinance, or a permit from the LUC, as the case may be, unless an exemption from the permit requirement applies.

(c) No person shall sell, purchase, exchange, transport, receive, or offer to sell, purchase, exchange or transport any cultural resource in violation of:

(1) the prohibitions in paragraph (b) of this Section;

(2) the conditions of any permit issued pursuant to tribal or federal law; or

(3) any rule, ordinance or other provision of tribal or federal law in effect at the time of the prohibited conduct.

(e) No person who is not a tribal member shall conduct historical, cultural or other research, oral or written, scientific or non-scientific, or make recordings of any kind, regardless of the technology used, without first obtaining a permit pursuant to this Ordinance.

(f) Any person who receives a letter of inquiry from the Officer pursuant to Section 401 of this Ordinance shall respond truthfully within the time specified in such letter; any person who gives false information in response to a letter of inquiry is in itself a violation of this Ordinance.

Section 305. Permit Requirements

Any person, other than a person who is exempt from permit requirements by Section 306 of this Ordinance, proposing to visit or inspect cultural resources, undertake cultural resources inventory, alter, collect, excavate, or remove cultural resources or engage in ethnographic research, or to conduct any other activity that would otherwise be prohibited by Section 304, shall apply to the Officer for a Aquinnah Wampanoag Tribal Cultural Resources Permit, or to the LUC for a Land Use Permit, as the case may be. As provided in Section 308, the Officer shall issue rules to establish permit application procedures adopted by the CHC.

Section 306. Exceptions and Waivers

(a) The prohibition against, and permit requirement for, visitation of cultural resources shall not apply to enrolled members of the WTGH (A) or to Aquinnah Wampanoag tribal employees engaged in properly authorized official activities.

(b) The prohibition against, and permit requirement for, alteration, collection, disturbance, excavation or removal of cultural resources or for the conduct of ethnographic research does not apply to:

(1) Aquinnah Wampanoag tribal members engaging in activities directly related to the practice of traditional Aquinnah Wampanoag religion or traditional cultural practices.

(2) Tribal employees engaged in properly authorized official business, relating to cultural resource management approved in accordance with rules and/or guidance documents issued by the Officer and approved by the CHC.

(c) The Officer may waive otherwise applicable permit requirements on a case-by-case basis to allow access to cultural resources by traditional practitioners from other Indian tribes. The waiver policy shall be established by the CHC.

(d) The Officer may waive otherwise applicable permit or clearance requirements on a case-by-case basis in the event of an emergency or natural disaster. The waiver policy shall be established by the CHC.

(e) *Persons Not Exempted.* Employees of federal or state agencies are not exempted from the permit requirement. In addition, persons serving as agents for the WTGH (A) who are not employees of the WTGH (A) (such as consultants, advisors, and others who provide services under contract), are not exempt from the permit requirements of this Ordinance. Through the issuance of rules, the Officer may establish expedited procedures for such persons to obtain permits.

Section 307. Classes of Permits

(a) There shall be four classes of permits.

(1) Class A permits shall be issued for activities involving casual visitation and inspection of cultural resources. Class A permits may also be issued to traditional practitioners who are members of other Indian tribes in the event that such persons choose to apply for a permit rather than to ask the Officer for a waiver of the permit requirement.

(2) Class B permits shall be issued for cultural resources inventory activities involving no disturbance of the cultural resources.

(3) Class C permits shall be issued for cultural resources investigations involving alteration, collection, excavation, removal or any disturbance of cultural resources. If expressly authorized, a Class C permit may allow the excavation of human remains. It is the intent of the Tribal Council that the issuance of a Class C permit will eliminate the need for tribal members and tribal employees to obtain a permit from the Bureau of Indian Affairs under the Archaeological Resources Protection Act (ARPA). In issuing rules to establish a program for issuing Class C permits, the Officer shall ensure that the tribal permit program is adequate to eliminate, to the extent possible, the otherwise applicable requirement to obtain an ARPA permit and, to the extent that eliminating the ARPA permit requirement is not possible, to expedite compliance with the requirements of ARPA.

(4) Class D permits shall be issued for activities involving research into the cultural resources of the WTGH (A), including ethnographic, historical, cultural or other research. Any form of recording that results from any such research must conform to the terms and conditions of a permit.

(b) Permits shall normally only be issued on a case-by-case basis, except that Indian preference firms may be granted blanket Class B permits. The CHC may waive this requirement and issue blanket permits whenever it finds that the issuance of a blanket Class B permits would be in the best interests of the WTGH (A).

(c) Permits shall not be issued for a period of more than twelve months, except when longer periods are required to allow for the completion of a single project. In rules for permit programs under this Ordinance, the CHC is authorized to establish other categories in which a permit may be issued for a period of longer than twelve months.

Section 308. Permit Application Procedures

(a) *Rules*. The Officer shall establish procedures for permit applications through the issuance of rules adopted by the CHC. When such rules have been adopted, the CHC may issue a permit to any qualified person, subject to appropriate terms and conditions, and subject to the full payment of any permit fees assessed by the CHC.

(b) *Fees*. The rules shall include an appropriate schedule of fees for the various classes of permits, and may provide for the Officer to grant a waiver of fees in appropriate cases. The CHC shall reconsider the fee schedule on a periodic basis, at least every three years, and may revise the schedule whenever in it's judgment revisions are warranted, provided that any change in the fee schedule must be in accordance with Section 208.

(c) *Special Provisions for Class C Permits*. In issuing rules for Class C permits, the Officer shall take into consideration the requirements for permits under the Archaeological Resources Protection Act (43 C.F.R. part 7, 25 C.F.R. part 262), in order to ensure that a tribal permit is adequate to eliminate the need for an ARPA permit to the extent possible and, in circumstances in which an ARPA permit is required, to expedite ARPA compliance.

(d) *Hearings and Appeals*. If an application for a permit is granted or denied, the applicant or any interested person may request a hearing from the Officer pursuant to Section 502. Final decisions made by the CHC are subject to judicial review pursuant to Section 503.

(e) *Relationship to Land Use Ordinance.* The issuance of any permit pursuant to this Ordinance shall not constitute "development" under the Aquinnah Wampanoag Land Use Ordinance and shall not require a development permit; rather, the issuance of a permit under this Ordinance, if required for a development project, will be required prior to the consideration of an application for a development permit by the Land Use Commission.

Section 309. Suspension and Revocation of Permits

(a) *Suspension or Revocation for Cause.*

(1) The Officer may suspend a permit for cause upon determining that the permit holder has failed to meet a term or condition of the permit or has violated any prohibition of this Ordinance or the rules issued to carry out this Ordinance.

(2) The Officer may revoke a permit for cause upon determining that:

(A) The permit holder has failed to correct the situation that led to the suspension of the permit within the time specified in the notice of suspension;

(B) The permit holder has been convicted of a criminal violation of this Ordinance or of other tribal or federal law in a matter directly related to the activities covered by the permit;

(C) A civil penalty has been assessed against the permit holder pursuant to this Ordinance or pursuant to other tribal or federal law in a matter directly related to the activities covered by the permit; or

(D) The permit holder has engaged in activities that would be grounds for the suspension of a permit, and the permit holder has previously had a permit suspended for cause.

(b) *Suspension or Revocation Without Fault.* The Officer may suspend or revoke a permit for reasons not relating to the conduct of the permit holder upon determining that continuation of work under a permit would not be in the best interests of the WTGH (A) or would be in conflict with legal requirements or land management policies not in effect when the permit was issued. Such a suspension or revocation is made without liability to the WTGH (A), its employees and agents. Such a suspension or revocation shall not prejudice the ability of the permit-holder to hold or obtain other permits.

(c) *Notice of Hearing.* The Officer shall provide written notice to the permit holder of the suspension or revocation, the cause of the suspension or revocation and, in the case of a suspension, the requirements that must be met before the suspension will be lifted. The permit holder may request a hearing before the CHC after issuance of the initial decision regarding the suspension or revocation. Such hearing shall be held within 30 days after receipt of the written request, or as soon thereafter as reasonably practical. The CHC may affirm, modify or reverse his initial decision based upon the evidence presented at the hearing.

(d) *Effective Date.* Suspension of a permit shall be effective immediately unless a later date is specified in the notice of suspension. Revocation of a permit shall be effective 30 days after issuance of the notice of revocation, unless a later date is specified. If the permit holder requests a hearing, then: (1) an order of suspension shall remain in effect pending the final determination by the Officer on appeal, unless the Officer in his sole discretion orders otherwise; (2) an order of revocation, if upheld, shall be effective thirty (30) days after the final determination by the Officer on appeal.

PART 4. ENFORCEMENT

Section 401. Investigations

The Officer is authorized to investigate compliance with permits issued pursuant to this Ordinance and to investigate activities that are being carried out without a permit in possible violation of this Ordinance. As part of an investigation, the Officer may serve any person with a letter of inquiry. Any such letter of inquiry shall inform the person to whom it is addressed that: answers must be provided to the Officer within 60 days; failure to respond may result in the imposition of civil penalties; information provided may be used in law enforcement proceedings; and giving false information is in itself a violation of this Ordinance.

Section 402. Notices of Violation

(a) If the Officer has reason to believe that a violation of this Ordinance has occurred, or is occurring, the Officer is authorized to issue a Notice of Violation to the person(s) apparently responsible for the violation. If the apparent violation occurred, or is occurring, on land in which a person other than the alleged violator holds a property interest, a Notice of Violation shall also be issued to the holder of such an interest.

(b) A Notice of Violation shall include:

(1) a concise statement of facts believed to constitute a violation;

(2) specific reference(s) to the provision(s) of this Ordinance and/or the rules to carry out this Ordinance allegedly violated;

(3) the proposed amount of a civil penalty pursuant to Section 406 of this Ordinance (possibly accompanied by a proposal to reduce or waive collection of the amount if the violator takes certain actions to mitigate damage) or a statement that a penalty may be assessed in an amount to be determined after further investigation;

(4) a statement that the amount of the civil penalty may be doubled if the violation continues to occur after the Notice of Violation has been served on the alleged violator; and

(5) an explanation of rights to petition for relief, request an administrative hearing, and seek judicial review of any final determination pursuant to Part 5 of this Ordinance.

(c) A Notice of Violation may include a Summons to appear before the Officer at an enforcement hearing at a specified time and date. If such a Summons is included it shall advise the alleged violator that failure to appear will constitute a violation of this Ordinance, which may result in the imposition of civil penalties.

(d) A Notice of Violation may be served on an alleged violator by the Officer or by an employee of the Office or, at the request of the Officer, by a Tribal law enforcement officer.

(e) A Notice of Violation may be served on a permit holder before the Officer issues a notice of suspension or revocation of a permit pursuant to Section 309.

Section 403. Cease and Desist Orders

(a) If the Officer has reason to believe that an ongoing and continuing violation is occurring, or that there is a substantial likelihood that a violation will occur in the near future, the Officer is authorized to petition the Tribal Council (Tribal Court when established) for a Cease and Desist Order to prevent the violation from continuing or occurring. The Officer's petition shall include a brief statement of facts, according to the Officer's

information and belief, and a brief explanation of how the alleged facts, if true, constitute a violation of this Ordinance.

(b) The Tribal Council (Tribal Court when established) is authorized to issue a Cease and Desist Order upon a showing by the Officer that:

(1) probable cause exists that a violation is occurring, or is likely to occur in the near future; and
(2) the violation has resulted in, or is likely to result in, damage to cultural resources.

(c) If the petition concerns a violation for which the Officer has issued a Notice of Violation, a showing by the Officer that the conduct has continued after the Notice of Violation was served on the alleged violator shall be sufficient to establish probable cause that a violation is occurring, or is likely to occur in the near future.

(d) The consideration by the Court of a petition by the Officer for a Cease and Desist Order shall not require that notice of the hearing be provided to the alleged violator.

(e) A Cease and Desist Order shall include:

(1) a concise statement of facts believed to constitute a violation of this Ordinance;
(2) specific reference(s) to the provision(s) of this Ordinance and/or the rules to carry out this Ordinance allegedly violated;
(3) A statement that the Tribal Council (Tribal Court when established) has determined that there is probable cause to believe that a violation has occurred or is likely to occur in the near future;
(4) a statement that the alleged violator must Cease and Desist the conduct that constitutes a violation and that failure to comply with the Cease and Desist Order is in itself a violation of this Ordinance;
(5) the proposed amount of a civil penalty pursuant to Section 406 of this Ordinance (possibly accompanied by a proposal to reduce or waive collection of the amount if the violator takes certain actions to mitigate damage) or a statement that a penalty may be assessed in an amount to be determined after further investigation;
(6) a statement that the amount of the civil penalty may be tripled if the violation continues to occur after the Cease and Desist Order has been served on the alleged violator; and
(7) an explanation of rights to petition for relief, request an administrative hearing, and seek judicial review of any final determination pursuant to Part 5 of this Ordinance.

(f) A Cease and Desist Order may be served on an alleged violator by the Officer or by an employee of the Office or, at the request of the Officer, by a Tribal law enforcement officer.

Section 404. Criminal Penalties

(a) *Tribal Criminal Penalties.* It is a criminal offense for an Indian person to violate any of the prohibitions of Section 304 of this Ordinance or to knowingly counsel, procure, solicit, or employ any other person to violate any of the prohibitions of Section 304. Upon conviction in Tribal Council (Tribal Court when established), such a criminal offense may be punishable by restitution, community service, a fine not to exceed $5,000, and/or imprisonment for a term not to exceed one year. For the purposes of this Ordinance, each act committed on Aquinnah Wampanoag tribal lands that constitutes a criminal offense shall be considered a separate offense. A person convicted of such an offense may also be subject to civil penalties.

(b) *Federal Criminal Penalties.* Any person who commits an act on Aquinnah Wampanoag tribal lands that would be a criminal offense under this Ordinance if committed by an Indian may also be subject to criminal prosecution under federal law.

Section 405. Trespass

Any nonmember of the WTGH (A) who violates any prohibition in Section 304 of this Ordinance without having obtained the relevant permit has committed trespass. Nonmember Indians may be subject to prosecution in Tribal Council (Tribal Court when established); non-Indians may be subject to civil actions in federal court; all persons may be subject to civil actions in Tribal Council (Tribal Court when established) for damages. Any law enforcement action taken on grounds of trespass may be separate from enforcement actions taken under other provisions of this Ordinance. The circumstances relating to the trespass may be taken into consideration in the event that civil penalties are imposed.

Section 406. Civil Penalties

(a) *Conduct Subject to Civil Penalties.* Individuals who violate the prohibitions in Section 304 of this Ordinance shall be subject to civil penalties, which may be assessed by the Officer, in accordance with rules adopted expressly for this purpose. A permit holder who engages in conduct that violates the terms and conditions of his or her permit is considered to violate the prohibitions in Section 304.

(b) *Procedure for Assessing Penalties.* Following the procedure set out in Section 208, the Officer shall issue rules for the assessment of civil penalties. In developing these rules, the Officer may draw upon the procedures used by the Department of the Interior for assessing civil penalties under the Archaeological Resources Protection Act (43 C.F.R. §§ 7.15, 7.16) and the Native American Graves Protection and Repatriation Act (43 C.F.R. § 10.12). At a minimum, the procedure shall include:

(1) *Notice of Violation*, in accordance with Section 402 of this Ordinance;
(2) *Response Period* of at least forty-five (45) days after service of the Notice (or service of the proposed penalty amount if not included in the Notice) for the alleged violator to respond to the Notice of Violation, during which the alleged violator may seek informal discussions with the Officer or may file a Petition for Relief pursuant to Section 501;
(3) *Assessment of Penalty*, by the Officer after the expiration of the Response period or after consideration of a Petition for Relief, unless the Officer determines that, based on all the available information, no violation has occurred;
(4) *Notice of Assessment*, which shall be formal notification to the violator of the amount due, how to pay it, and appeal rights pursuant to Part 5 of this Ordinance.

(c) *Penalty Amounts.* Rules to carry out this Section shall include guidelines for the Officer to use in assessing civil penalties. The Officer shall take appropriate measures to inform the public regarding civil penalties under this Ordinance.

(1) For violations relating to failure to obtain Class A, B, or D permits, the civil penalty amounts may be set at relatively nominal amounts for first time offenders, but shall be at least comparable to the fees that would be charged for such permits. The rules shall provide for penalty amounts to be substantially increased for second and third offenses.

(2) With respect to Class C permits, the Officer shall develop a system for determining penalty amounts that reflects consideration of the following factors:

(A) Costs of restoration and repair of damaged cultural resources and the archaeological or commercial value of cultural resources that are destroyed or otherwise not recovered;

(B) Enforcement and administrative costs associated with the assessment and collection of the civil penalty;

(C) Cost of disposition of cultural resources, including as appropriate, cost of curation in perpetuity;

(D) Costs associated with documentation, testing and evaluation of the cultural resource in order to assess the characteristics of the cultural resource and plan for its restoration; and

(E) Costs of any additional mitigation measures the Officer deems appropriate to implement;

(F) An amount based on the loss to the WTGH (A) of the use of cultural resources for cultural and religious practices;

(G) For any second offense, a factor allowing the total penalty amount to be doubled or tripled, in the Officer's judgment depending upon the nature of the offense.

(H) A factor allowing the total amount of the penalty to be doubled in the event that conduct constituting a violation continued after service of a Notice of Violation and tripled if such conduct continued after service of a Cease and Desist Order.

(c) *Referral to Federal Authorities for Civil Penalties.* In lieu of, or in addition to, imposing civil penalties under this Ordinance, the Officer may refer matters to federal authorities. Any penalties collected by the federal government and paid to the WTGH (A) (pursuant to 43 C.F.R. § 7.17(c)) shall be deposited in the THPO Revenue Account established pursuant to Section 204 of this Ordinance.

Section 407. Civil Forfeitures

(a) *Seizure and Forfeiture of Personal Property.* In the event that a Tribal Law Enforcement Officer is present at the scene of any violation of this Ordinance, whether or not in the process of serving a Notice of Violation and/or Cease and Desist Order, the Officer is authorized to seize all items of personal property that apparently have been involved in the violation. Title to such property shall be deemed to vest in the WTGH (A) at the time of the commission of the unlawful activity, provided that the Officer brings an action with the Tribal Council (Tribal Court when established) to perfect the WTGH (A)'s title and the Tribal Council (Tribal Court when established) issues a ruling in favor of the Office. If the former owner is present at the time of seizure, the Officer shall obtain the necessary information to provide such person information on the procedure to seek the return of such property; if not present at the time of seizure, a notice shall be posted and other reasonable steps taken to provide notice to the former owner.

(b) *Action To Perfect the Office's Title in Seized Property.* The Officer may file an action with the Tribal Council (Tribal Court when established) seeking to perfect the WTGH (A)'s title to any personal property seized. Any such action shall be considered by the Tribal Council (Tribal Court when established) in accordance with Section 504 of this Ordinance. The former owner of seized property shall be referred to as a "claimant." If the Officer fails to file such an action within 60 days after the date of seizure, the items of personal property that were seized shall be returned to the claimant. At any time that an action to perfect the WTGH (A)'s title in seized property is pending, the Officer is authorized to return the seized property to its former owner upon timely payment of any and all related civil penalties that may have been assessed against the violator.

(c) *Use by Office.* Any forfeited property title to which has vested in the WTGH (A) pursuant to an order of the Tribal Council (Tribal Court when established) shall be made available for the use of, or disposition by, the Office upon the expiration of the period for filing an appeal in Tribal Court of Appeals (when

established). At any time up until the property is made available for the use of the Office, the Officer is authorized to return the property to the former owner if any and all civil penalties assessed against the former owner have been paid.

(d) *Seizure under Federal Law*. The Officer is authorized to cooperate with federal officials with respect to the forfeiture of items of personal property in connection with violations of the Archaeological Resources Protection Act. Any such items that are transferred to the WTGH (A) (pursuant to 43 C.F.R. § 7.17(c)) shall be made available for the use of, or disposition by, the Office.

(e) *Seizure of Cultural Resources.* Cultural resources located within Aquinnah Wampanoag tribal lands are presumed to be the property of the WTGH (A) unless tribal customary law provides otherwise. Thus unless a person who has excavated or otherwise removed a cultural resource from its proper setting is the holder of a permit authorizing such action, a presumption arises that a violation of this Ordinance has occurred. In the event that a Tribal Law Enforcement Officer is present at the scene of any apparent violation of this Ordinance at which cultural resources have been damaged, excavated, or removed from their proper settings, the Officer shall take appropriate steps to protect the cultural resources from further damage, which may include seizing the resources and holding them in police custody.

Section 408. Referrals to Federal and Other Authorities

When, in the judgment of the Officer after consultation with the CHC, it would serve the interests of the WTGH (A), the Officer is authorized to provide information to, and cooperate with, federal agencies, state agencies, and other Indian tribes in the enforcement of cultural resources laws within Aquinnah Wampanoag Tribal lands and Aquinnah Wampanoag traditional ancestral lands.

Section 409. Civil Actions in Federal Court

When, in the judgment of the Officer after consultation with the CHC, it would serve the interests of the WTGH (A) to file a civil action in federal court to seek protection or recognition of the WTGH (A)'s rights and interests under federal law relating to cultural resources, the Officer shall so provide CHC recommendation to Tribal Council for action. The Tribal Council must authorize filing of such an action. In the event that the Officer and the Tribal Chairperson both conclude that the matter is an emergency, the Chairperson shall conduct a telephone poll of the Tribal Council pursuant to Article XII section 5 of the Constitution of the WTGH (A).

PART 5. APPEALS AND JUDICIAL REVIEW

Section 501. Petitions for Relief

A person who has been served with a Notice of Violation that includes a proposed civil penalty may file a Petition for Relief with the CHC. The person filing such a Petition may request that no penalty be assessed or that the penalty amount be reduced. The Petition shall include reasons in support of the request. Any such Petition must be filed within forty-five (45) days of the date on which the Notice of Violation was served (or from the date that the penalty amount was proposed, if later). The CHC's decision in response to a Petition for Relief shall be conveyed to the Petitioner in the Notice of Assessment issued pursuant to Section 406.

Section 502. Administrative Hearings

(a)*Hearings Before the CHC.* The CHC is authorized to conduct adjudicatory hearings regarding clearances under Section 303, permit applications under Section 308, suspensions or revocations of permits under Section 309, notices of violation under Section 402, and any other instances in which a hearing is authorized pursuant to this Ordinance or rules issued to implement this Ordinance. The Officer will assume responsibility for presenting the Office's case at the hearing. The Tribal Administration may provide legal counsel to assist Office staff and/or the Office may provide its own legal counsel. The person whose permit or actions are the subject of the hearing or who has requested the hearing may be represented by legal counsel at that person's own expense.

(c) *Rules.* The CHC shall issue rules governing the conduct of administrative hearings. The rules shall specify the steps in the hearing process, identify who may, request a hearing, establish notification requirements and time limits for action on the part of all parties, enumerate documentation requirements, and include any other elements the CHC determines are necessary to carry out the purposes of this section. In addition, these rules shall ensure that parties to hearings are afforded administrative due process, including:

(1) notice of the time and place of the hearing;
(2) an opportunity to present reasons in support of the ruling that the appellant seeks;
(3) an unbiased tribunal; and
(4) a written decision including reasons in support of the decision.

Section 503. Judicial Review

(a) *Review of Administrative Hearings.* Any person who participated in an administrative hearing and who is adversely affected by the outcome of the hearing under the rules promulgated pursuant to Section 502 of this Ordinance shall be entitled to review of the action in with the Tribal Council (Tribal Court when established). Such an appeal must be filed in writing with the Tribal Council (Tribal Court when established) within thirty (30) days of notification of the decision based on the administrative hearing.

(b) *Review of Decisions without Administrative Hearings.* Any person who is entitled to a hearing before a Hearing before the CHC shall have a right to judicial review of the original decision. Such an appeal must be filed in writing with the Tribal Council (Tribal Court when established) within thirty (30) days. In such a case, any person who would be directly and adversely affected by a decision of the CHC, or by the judicial modification or reversal of a decision by the CHC may file an appeal with the Tribal Council (Tribal Court when established). In the event the original party files an appeal, any person who could have appealed in his/her own right may participate in the appeal as an intervener. In the event that the person entitled to a hearing does not file an appeal within the allotted thirty (30) days, any person who could have appealed as an intervener may petition within ten (10) days after the expiration of the time allowed for filing by a person originally entitled to a hearing.

(c) *Standards for Review.* The Tribal Council (Tribal Court when established) shall review decisions after administrative hearings based on the pleadings and the administrative record. The Tribal Council (Court when established) shall not make its own inquiry into the facts. In all cases, the Tribal Council (Court when established) may review questions of law on a *de novo* basis. The Tribal Council (Court when established) shall not set aside or reverse a decision of the CHC unless the Council (Court when established) finds that the decision:

(1) is not supported by substantial evidence;
(2) was issued without compliance with the requirements of this Ordinance or rules issued pursuant to this Ordinance;
(3) is arbitrary and capricious;
(4) deprived the appellant of any right guaranteed by Article III of the Constitution of the WTGH (A); or
(5) deprived the appellant of due process of law or other rights that the appellant may have under the Indian Civil Rights Act (25 U.S.C. 1301-1341).

(d) *Cultural and Historic Commission.* In any case arising under this Ordinance, the Tribal Council (Tribal Court when established) may seek advice from the CHC on questions relating to tribal cultural traditions.

(e) *Private Right of Action in Tribal Council (Tribal Court when established).* In any case in which a person or governmental agency subject to this Ordinance, including an agency or instrumentality of the WTGH (A), has carried out an undertaking without first obtaining clearance from the Officer pursuant to Section 303, and the Officer has not initiated enforcement by issuing a Notice of Violation or by petitioning the Tribal Council (Tribal Court when established) for a Cease and Desist Order, any person who is directly and adversely affected by the violation of the Section 303 clearance requirement may file an action in Tribal Council (Tribal Court when established) seeking an Order to enjoin the undertaking and to compel the alleged violator to apply for and obtain clearance from the Officer prior to resuming the undertaking. In any such case, the person filing the action shall bear the burden of showing, by a preponderance of the evidence that a violation of Section 303 has occurred. If the Tribal Council (Tribal Court when established) determines that injunctive relief is warranted in such a case, and issues an appropriate Order, action taken by the Officer on an application for clearance after the issuance of such an Order by the Tribal Council (Tribal Court when established) shall be subject to hearing and judicial review in the same manner as other determinations by the Officer.

(f) *Waiver of Sovereign Immunity.* This section of the Ordinance constitutes a limited waiver of tribal sovereign immunity for actions in Tribal Council (Tribal Court when established) against agencies and officers of the WTGH (A), *provided* that any such actions shall be limited to injunctive relief.

(g) *Tribal Court of Appeals.* A decision by the Tribal Council (Tribal Court when established) adjudicating a dispute arising under this Ordinance may be appealed to the Tribal Court of Appeals (when established) in accordance with such rules as that Council (Court when established) may prescribe.

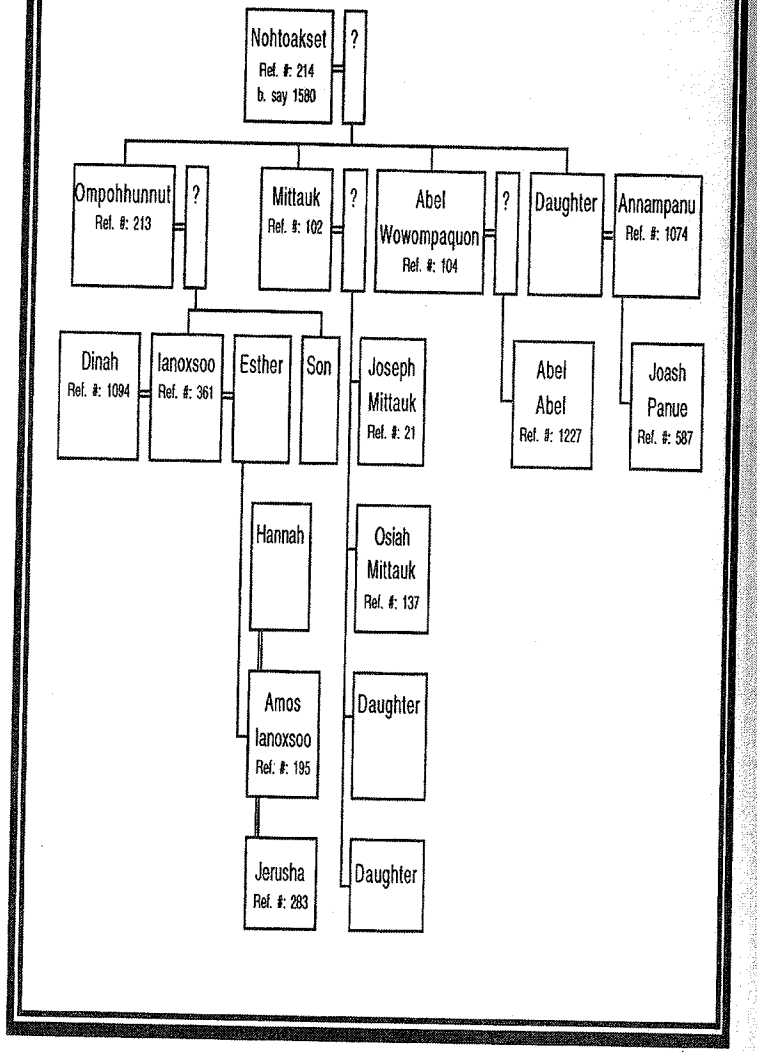
Section 504. Actions To Perfect the WTGH (A)'s Title in Seized Property.

(a) *Action Filed by the Officer.* The Officer is authorized to file an action with the Tribal Council (Tribal Court when established) to perfect the WTGH (A)'s title in any property that has been seized pursuant to Section 406 of this Ordinance. Any such action must be filed within 60 days from the date on which the seizure occurred.

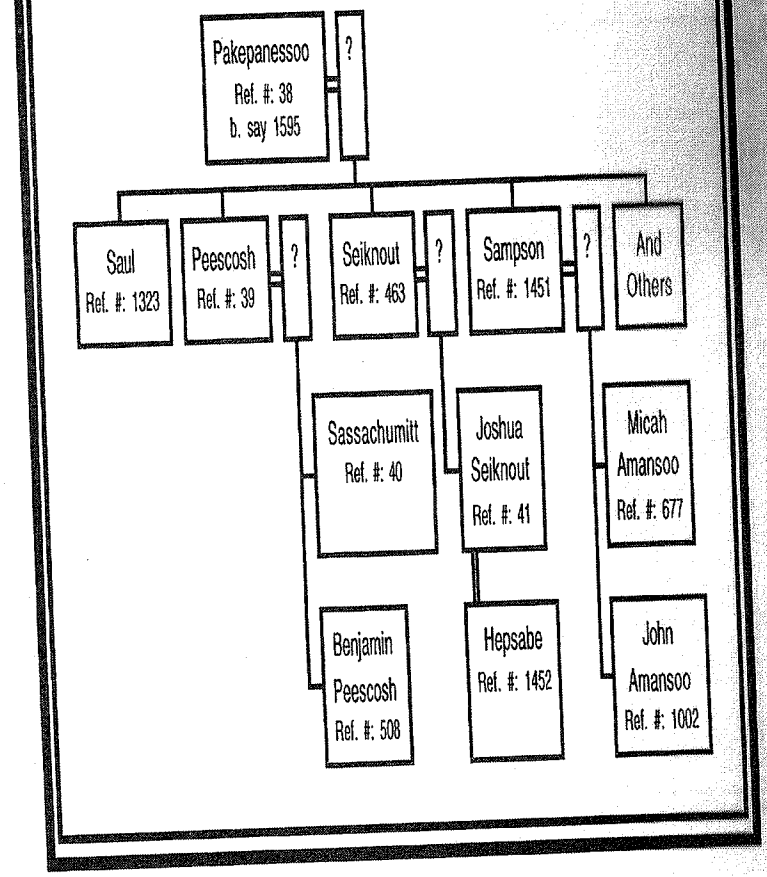
(b) *Burden of Proof.* The Officer bears the initial burden of establishing probable cause that any item of personal property seized was associated with or involved in unlawful activity. If the Officer meets this initial burden, the claimant bears the burden of showing, by a preponderance of the evidence that the item of personal property is not subject to forfeiture. This burden can be met by disproving probable cause or by establishing innocent ownership of the property.

(c) *Appeals.* A decision by the Tribal Council (Tribal Court when established) in a civil forfeiture action under this Ordinance may be appealed to the Tribal Court of Appeals (when established) in accordance with such rules as that Court may prescribe.

Descendants of Nohtoakset, Sachem of Aquinnah



Descendants of Pakepanessoo, Sachem of Chappaquiddick



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this question with any certainty. Evidence suggests that the Wampanoag were divided into a loosely allied confederation of sachemships (Speck, 1928a). These were arranged hierarchically so that petty sachems paid tribute to greater ones and all paid tribute to their principal Sachem at Pokanoket (Marten, 1970). Such loose alliances of territorial groups generally imply a fairly fluid system whereby men from one group may join with those of another under pressure of economic or political need for larger aggregations of hunters or warriors. Banks also records that Vineyard sachems were not always natives of the Vineyard, suggesting that island ties to the mainland were strong--"but in what manner they acquired their rank and entered into the enjoyment of their prerogatives is not known" (Banks, 1966, v. 1: 40). Certainly the Vineyard Indians were trading in the early 17th century: at least two were taken prisoner by a Captain Edward Harlow (Jennings, 1975) in 1611. One we know only as Coneconam, the other, Epanowe or Appanowe, was exhibited with other Indians to audiences curious enough to pay a small fee to Captain Harlow for the privilege of viewing the "savages." When public interest in Indians ceased to be profitable, Harlow turned Epanowe over to Ferdinando Gorges. Together with another Wampanoag, Assacumet, taken prisoner in 1605, Epanowe succeeded in escaping from a ship sent by Gorges to

inflicted greater suffering on them, more and more Indians sought out the new "medicine" of the hardworking Mayhews. Christian Indians undoubtedly died in these epidemics--repeatedly testing the faith of new converts. However, the English themselves suffered far less--quite probably leading doubting Christian Indians, whose knowledge of the faith was, after all, highly imperfect, to conclude that their own deaths were the product of inadequate knowledge or lack of zeal. And although the Gay Head Indians living farthest away from the colonial settlement at Great Harbor were more wary and suspicious of Christianity than those living close by, they, too, were brought into the church within twenty years of the colony's founding.

In 1647, the Sagamore Towanquattick brought his sick son to Mayhew for curing. Mayhew bled the young man and prayed for him, and his recovery was the occasion of Towanquattick's conversion. With Towanquattick's approval, Mayhew then established fortnightly meetings for the Indians within a six-mile radius of the English colony. Although the reaction of the "heathen" Indians was hostile and one group even threatened Towanquattick's life, they took no action.

Also in 1647, Momanequem, a son of one of the principal Indians of Gay Head, who was living with his mother at Nunnepaug, converted and shortly began preaching to the

up-island Indians. Momanequem's conversion illustrates the manner in which the network of relationships that tied the Indians to one another in various parts of the island aided Mayhew's work. The Indians were exogamous: hence families in the down-island territories were related to those up-island--and the influence of Christianity was more widely disseminated.

At the same time, off-island influences, which might have swayed the Christian Indians in their adherence to the new religion, were attenuated by distance, and Mayhew's ability to keep his promises to the Indians kept potential restiveness to a minimum.

Although Mayhew's initial attempts at conversion were undertaken on his own initiative (and that of his son), and without outside aid of any kind, the establishment in 1649 of the Corporation for the Propagation of the Gospel, through an act of England's Long Parliament, subsequently provided government patronage and money for missionary work among the Indians. Although the amounts of money expended on these ventures were small, the Indian converts who received them undoubtedly valued this steady source of both income and prestige.

In 1650 some of the Pow Wows themselves came over to Christianity and, in 1652, eight of them--in addition to 282 Indians (not counting children)--had publicly forsaken their

regarding the relationship between Gay Head and Rhode Island during the 18th century, documents from the 19th century indicate that Gay Head conducted much of its trade in New Bedford and retained ties to remnant Indians in Narragansett Bay. During these centuries the sea route to New Bedford and Rhode Island was relatively simpler to negotiate than the overland trip from Gay Head to the down-island communities. It seems reasonable to suppose that a traffic in goods, ideas and people followed the same route during the seventeenth and eighteenth centuries, using Indian networks remaining from the sixteenth century. Folger's influence over Gay Head may have been funnelled through these coastal networks after he was sent from the island, and it is quite reasonable to accept the Baptist version of the town's religious history, which asserts Folger's responsibility for the Indians' disaffection from Congregationalists.

The Baptists also offer another explanation for the conversion--suggesting that the Indians chose the Baptist faith because it maximized their autonomy and separation from the Whites (Whitcomb, 1953: 11):

> Gay Head was the last stand of the Red Man on the Island. Driven out on this rocky peninsula by the encroachment of the whites, bitter antagonisms developed and deepened against alien ownership of what had once been his own land. . . . However benevolent the purpose of the Society for the Propagation of the Gospel, the results were bad, and a bitter resentment spread over taxes and titles.

By all accounts even at the end of the nineteenth century, Gay Head relationships with other islanders were extraordinarily tenuous.

> Everyone had a boat. The boats that used to go to No Man's land wuz some pretty. My uncle had boats and it was cheaper to go to New Bedford than to Vineyard Haven so we used to go there. It was much cheaper. That's the reason they done it. We got to New Bedford on cat boats.

The informant claims cost as the reason for going to New Bedford and undoubtedly, then as now, prices for goods produced on the mainland were cheaper there than on the island. Whether Indians felt more comfortable in New Bedford than in Vineyard Haven is unclear; they had, at any rate, been making the journey across the sound for centuries and had established and maintained Indian networks in New Bedford and even as far away as Providence, Rhode Island. On rare occasions Gay Headers made trips down-island:

> Ever since I can remember there's always been a store in Chilmark. We'd go in ox carts and we had a fella here then--he had a pension--must be the Spanish War. He always got a check every month and he'd hire me or my sister to take him down to Chilmark. And they'd buy all sorts of things and we'd eat them on the way up . . . those were good old times.

Lentaste

as a result of allotment to obtain the kind of land they needed. Undoubtedly some kin or neighbors were favored over others in these land exchanges and although it is difficult to get informants to talk about these past inequities, resentment over land plays a large role in community relations even today.

Another activity that brought the community together was illness:

> If we had sick people we'd gather up and go around and go in and have psalm service and everything like that. Why this place is somethin' different.

These octogenarians also spoke of the continued utilization of cranberries for cash income. Once picked for home use with the surplus going for support of the poor, the cranberries which grew wild on the town's common were now picked by families and sold for groceries:

> Cranberr'in'--that's how we got our flour and molasses and all that. We'd pick cranberries and take 'em over to New Bedford and sell 'em and then we'd get a barrel of flour, a barrel of port, a keg of mallasses and thet'd go all winter. . . . We made a livin'.

Cranberrying was important to the Gay Headers because the cranberries had become the town's only surplus agricultural product. While fishermen got cash from sales of their catch, Gay Head farmers could obtain cash only through cranberrying, part-time fishing or from catering to tourists. "Cranberry Day" had been set aside by the state

Gay Head until after the community was incorporated as a town when commercial fishing became well-established in Gay Head.

The degree to which such fishing might have been possible without the incorporation of the town is difficult to assess. Several Indians had boats before incorporation and had been making regular trips across the sound to New Bedford and sometimes to Providence. In fact, contact between Gay Head and both New Bedford and Providence had its roots in pre-contact Wampanoag settlements there. Commercial fishing, however, required bigger boats, more equipment and some investment of money. Indian inability to borrow money might have precluded such enterprise.

Before incorporation, Indians had jealously guarded their borders against the incursions of outsiders into their community; the only white persons in the town were those who were married to Indians, the minister or teacher, and the U.S. government employees who manned the lighthouse. Incorporation of the town opened its boundaries--and its shores--to other Islanders. Within ten years after incorporation, a group of Chilmark fishermen moved their marine operations from Squibnocket to the area subsequently known as Lobsterville in Gay Head.

Chilmark's fortunes had declined markedly as a consequence of the Civil War and the loss of its

the seabed beneath the water in the spring and pulled up in the fall to keep them from destruction by the winter gales that sweep across the sound. Each set of nets was tended by two to four men. At the turn of the century some seventeen sets of trap gear with over five traps in each set were in operation at Lobsterville. The gear required the constant attention of at least 36 to 40 adult males during the months from April through September. In late fall and winter the fishermen and their families made and mended boats, nets, pots and other equipment.

As lobstering expanded, children were often employed to fish with hook and line for flounder and skate used as lobster bait. Lobstering involved similar techniques: in spring, the men drove stakes for the lobster pounds. Each pound had two nets so that, if one fouled, another was immediately available to prevent the lobsters from escaping. Traps, marked with buoys, were weighted with rocks and dropped into the water. Each man had a number of traps and hauled in several strings each day. Cat boats went to market every two weeks--some to Oak Bluffs but most to New Bedford.

Although lobsters were taken only during spring and summer, lobstering was virtually a year-round job that involved, in addition to skills involved in seafaring and equipment production, access to woodlots for the stock

provide local access to goods produced outside the town; previously Gay Headers had been forced to travel to Chilmark, down-island, or to New Bedford for groceries.

Lobsterville was occupied continuously from about April until September, enabling fishermen to take advantage of seasonal fish migrations in the sound. Mackerel, scup and pollock were caught in the spring. Squeteague (seatrout or weakfish) and fluke schooled close to shore in summer and haddock could be caught with line trawls even in winter. Tautog (blackfish) were plentiful all year round as were lobsters which were first used only for local consumption and gradually developed commercial value.

The fishermen employed cat boats for shipping and for some kinds of fishing, and used dories or trap boats (heavier and more stable) to collect fish caught in their nets or to haul lobsters from pots. The cat boats--sailing craft with a single mast set well forward on the bow--could carry from five to thirty barrels--each containing 150 pounds of fish. The boats from Gay Head sailed primarily to New Bedford to sell their cargo.

Dangerous and physically trying, trap fishing depended upon the great abundance of off-shore fish, and, because of the nature of both harbor and boats, required considerable cooperation among the fishermen. The "traps" were actually nets strung between poles or spiles that were pounded into

Proposed Findings

Documents

June 25, 1985

(4) Proposed Finding Documents

- June 25, 1985

United States Department of the Interior, Office of Federal Acknowledgment
Wgh V001 D005 Page 1 of 127

Evidence for Proposed Finding against Federal Acknowledgment

of the

Wampanoag Tribal Council of Gay Head, Inc.

Prepared in response to a petition submitted to the Secretary of the Interior for Federal acknowledgment that this group exists as an Indian tribe.

June 25, 1985

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INTRODUCTION

This report has been prepared in response to the petition received by the Assistant Secretary - Indian Affairs from the Wampanoag Tribal Council of Gay Head, Inc., seeking Federal acknowledgment as an Indian tribe under Part 83 of Title 25 of the Code of Federal Regulations (25 CFR 83).

Part 83 establishes procedures by which unrecognized Indian groups may seek Federal acknowledgment of an existing government-to-government relationship with the United States. To be entitled to such a political relationship with the United States, the petitioner must submit documentary evidence that the group meets the seven criteria set forth in Section 83.7 of 25 CFR. Failure to meet any one of the seven criteria will result in a determination that the group does not exist as an Indian tribe within the meaning of Federal law.

Publication of the Assistant Secretary's proposed finding in the Federal Register initiates a 120-day response period during which factual and/or legal arguments and evidence to rebut the evidence relied upon are received from the petitioner and any other interested party. Such evidence should be submitted in writing to the Office of the Assistant Secretary - Indian Affairs, 1951 Constitution Avenue, N.W., Washington, D.C. 20245, Attention: Branch of Acknowledgment and Research, Code 440B.

After consideration of all written arguments and evidence received during the 120-day response period, the Assistant Secretary will make a final determination regarding the petitioner's status, a summary of which will be published in the Federal Register within 60 days of the expiration of the 120-day response period. This determination will become effective 60 days from its date of publication unless the Secretary of the Interior requests the Assistant Secretary to reconsider.

If at the expiration of the 120-day response period this proposed finding is confirmed, the Assistant Secretary will analyse and forward to the petitioner other options, if any, under which the petitioner might make application for services or other benefits.

Notes to the Reader

Abbreviations Used in the Report

Organizational name changes for Acknowledgment Staff:

BAR	Branch of Acknowledgment and Research (1984 to present)
BFA	Branch of Federal Acknowledgment (1981-1984)
FAP	Federal Acknowledgment Project (1978-1981)

BIA	Bureau of Indian Affairs
CPG	Corporation for the Propagation of the Gospel
GHWT	Gay Head Wampanoag Tribal Recognition Petition
MA or Mass.	Massachusetts

NARA National Archives and Records Administration, Washington, DC
RG Record Group (NARA records classification system)
SPG Society for the Propagation of the Gospel
WTCGH Wampanoag Tribal Council of Gay Head, Inc.

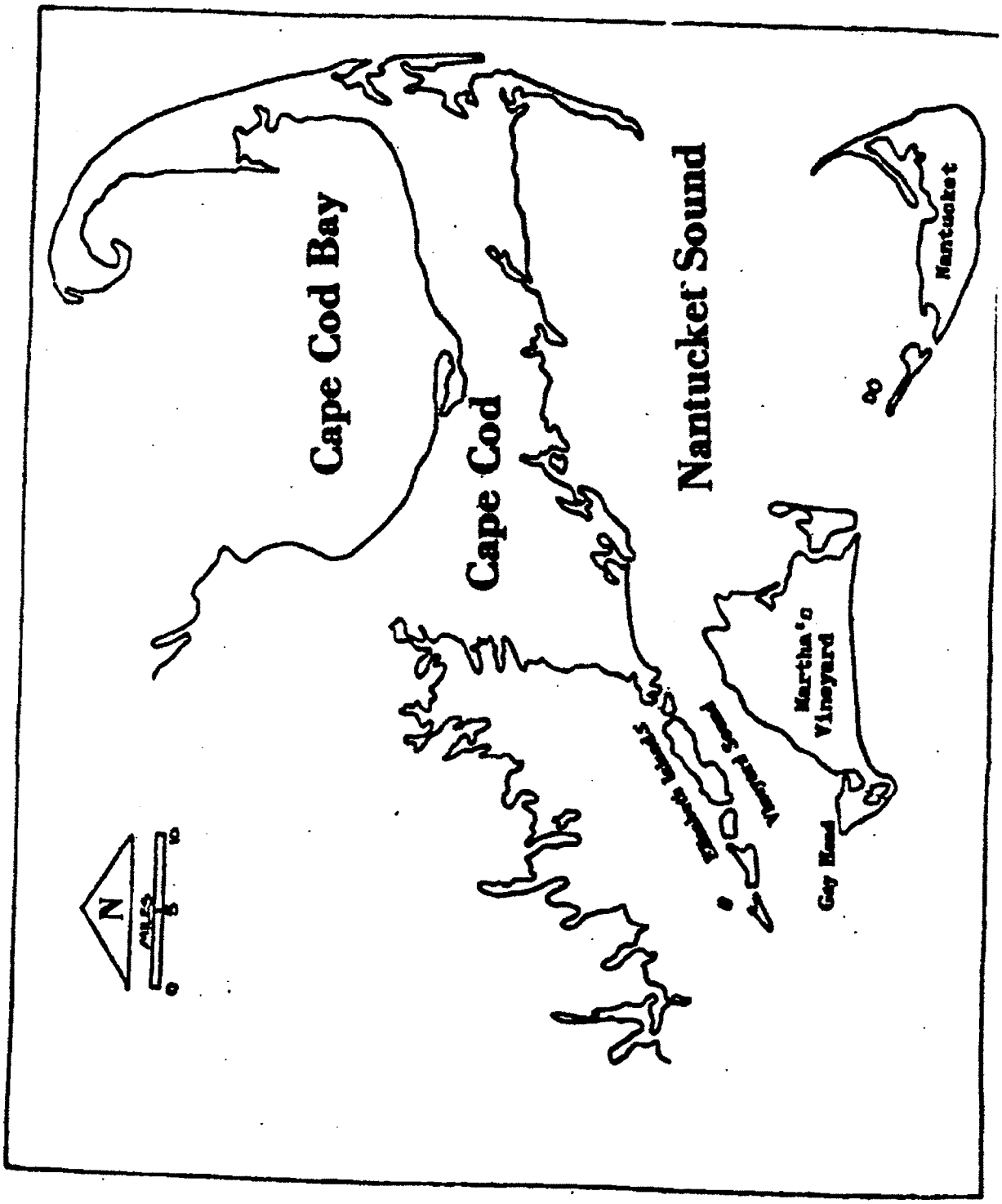
Explanation of 1871 Census

"1871 census" refers to Richard L. Pease's "Census of Inhabitants of Gay Head." The petitioning group refers to this census as the 1870 census or 1869/70 census. This report will refer to it as the 1871 census because the census does include one 1871 date in it and because it was published in 1871 as Appendix B of Pease's Report of the Commissioner Appointed to Complete the Examination and Determination of All Questions of Title of Land, and of All Boundary Lines Between the Individual Owners, at Gay Head, on the Island of Martha's Vineyard.

Chronological List of Organizations at Gay Head

Gay Head Improvement Association:
Established in 1914 by non-Indian property owners to protect their interests.
Aquineah Council (c.1928-1935):
Gay Head branch of Mashpee-based Wampanoag Nation, a pan-Indian organization.
Howwaswee Council (1935-c.1954):
Local Indian ceremonial organization which replaced the Aquineah Council.
Aquinnah Club (c.1945-c.1955):
Women's civic organization which led effort to bring electrification to town.
Gay Head Civic Association:
Civic improvement organization founded in 1950, which led drive to bring water to the Town Hall.
Pawkunnawakutt Council (c.1954-1972):
Indian ceremonial organization which replaced Howwaswee Council.
Gay Head Improvement Association:
Revived in 1955 by Indian descendants to promote civic activities and to foster an Indian identity.
Gay Head Community Council:
Established in 1966 and composed largely of non-Indian property owners who sought to reform town government.
Wampanoag Tribal Council of Gay Head, Inc. (1972-):
Petitioning group which claims to be the governing body of the Gay Head Indians. Incorporated Chief and Medicine Man from Pawkunnawakutt Council.
Gay Head Taxpayers Association (1973-)·
Outgrowth of Gay Head Community Council which led fight for fiscal reform in town and came to represent interests of non-Indian property owners in land suit.

Map #1


Cape Cod Bay
Cape Cod
Nantucket Sound
Nantucket
Martha's Vineyard
Gay Head
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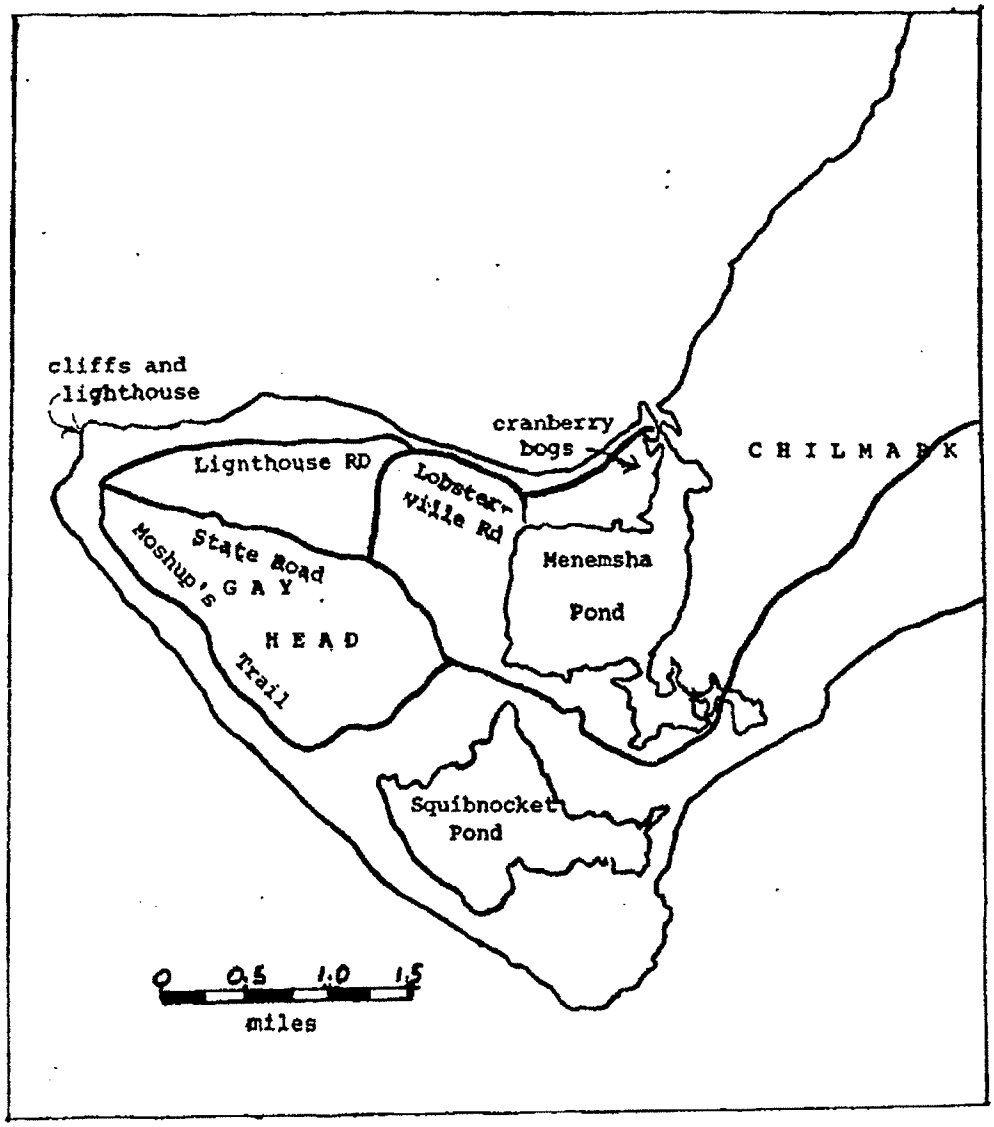
Map #2


cliffs and lighthouse
cranberry bogs
CHILMARK
Lignthouse RD
Lobster-ville Rd
State Road
Moshup's
GAY
HEAD
trail
Menemsha Pond
Squibnocket Pond
0 0.5 1.0 1.5
miles

SUMMARY UNDER THE CRITERIA (83.7 (a-g))

Evidence submitted by the petitioner and obtained through independent research by the Acknowledgment staff demonstrates that the Gay Head Wampanoags do not meet two of the seven criteria required for Federal acknowledgment. In accordance with the regulations set forth in 25 CFR 83, failure to meet any one of the seven criteria requires a determination that the group does not exist as an Indian tribe within the meaning of Federal law.

In the summary of evidence which follows, each criterion has been reproduced in bold face type as it appears in the regulations. Summary statements of the evidence relied upon follow the respective criterion.

83.7(a) A statement of facts establishing that the petitioner has been identified from historical times until the present on a substantially continuous basis, as "American Indian," or "aboriginal." A petitioner shall not fail to satisfy any criteria herein merely because of fluctuations of tribal activity during various years.

The Wampanoag Tribal Council of Gay Head, Inc., is based in the township of Gay Head, Massachusetts. Gay Head is a peninsula situated at the westernmost tip of Martha's Vineyard, the largest island in New England, which lies in the Atlantic Ocean approximately five miles off the southern coast of Cape Cod. The Tribal Council has only been in existence since 1972. Nevertheless, documentary sources clearly and consistently identify a group of Wampanoag Indian descendants as having lived in the general vicinity of the Gay Head peninsula from 1642, when Englishmen first settled on the island, to the present. The identification of a Wampanoag tribal entity at Gay Head was established in the colonial records of Governors Thomas Mayhew, Sr., and Mathew Mayhew (1642-1691) and in those of the Province of Massachusetts Bay (1691-1781). A Gay Head Indian tribal identification was also confirmed by church records, including those of the Baptist church organized in 1693, and in the records of two religious societies: the Corporation for the Propagation of the Gospel in New England, which maintained some control over the Gay Head Indians between 1711 and 1776; and the Society for the Propagation of the Gospel Among the Indians, which provided financial support for the Baptist ministry at Gay Head from the early 1800's until at least 1870.

Inhabitants of the Gay Head peninsula have consistently been identified as Indians or people of Indian descent in the legislative and judicial records of the Commonwealth of Massachusetts from 1870 to the present. However, the State did not officially recognize the existence of a tribal entity at Gay Head between 1870, the year in which Gay Head was incorporated as a town, and 1976, when the Tribal Council was recognized by the Governor as the governing body of the Gay Head Indians.

Gay Head Wampanoag descendants have also been identified as Indians in certain records of the United States Government beginning in 1799, when a Federal lighthouse was established at Gay Head. Indian descendants constituted the majority population at Gay Head on Federal census records compiled between 1870 and 1970, and on local censuses as early as 1792. Federal records also indicate that Indians from Gay Head were enlisted as surfmen in the U.S. Life-Saving Service (U.S. Coast Guard) after 1895, and enrolled at the Carlisle Indian Industrial School in Pennsylvania between 1905 and 1918.

More recently, Federal agencies such as the Department of Health and Human Services have provided project funding to the Gay Head Wampanoags based on their identification as Indians.

People at or from Gay Head were likewise positively identified as being an Indian group in travelers' accounts, local and regional histories, and travel guides; by anthropologists, historians, and other scholars; and in newspapers and other media.

The Gay Head Wampanoags have been identified as being an American Indian group from historical times until the present and therefore, meet the criterion 25 CFR 83.7(a).

83.7(b) Evidence that a substantial portion of the petitioning group inhabits a specific area or lives in a community viewed as American Indian and distinct from other populations in the area, and that its members are descendants of an Indian tribe which historically inhabited a specific area.

The Wampanoag Tribal Council of Gay Head is based on land which was traditionally and aboriginally Wampanoag. The area which now comprises the town of Gay Head has been viewed consistently throughout history as an Indian community or, more precisely since the late 18th century, as a community of "Indians and people of colour." This perception continues today, despite the fact that non-Indians now constitute the majority of its population. For much of its history the Gay Head community was accorded a special status by church and governmental officials because of its distinct Indian population.

The Gay Head Indians have continuously identified themselves as Wampanoag throughout history and have most often been referred to as Indians by the other residents of Martha's Vineyard. The Gay Head people are the only population on the island which has retained an Indian identity. Their social contacts were largely restricted to other Indian descendants, Blacks from down-island communities, and especially more recently, with Whites from off-island. Those Gay Head Indians who intermarried with Blacks or had Black ancestry were still generally regarded as being Indian as long as they remained on the island.

Since at least 1807, a substantial portion of the Gay Head Indian descendants have not resided in Gay Head or any other Indian community. In that year, James Freeman found approximately 41 percent of the Gay Head Indians to be absent from the Gay Head peninsula. The resident Indian population of the town of Gay Head declined by approximately 61 percent between 1900 and 1970. The current resident Indian population of 78, which has remained fairly stable over the past 40 years, represents only about 15 percent of the total membership of the Wampanoag Tribal Council of Gay Head. Not enough evidence has been found to conclude that cohesive tribal relations have been maintained since at least the 1930's, either within the local community or between those resident at Gay Head and the ever-growing number of non-resident Gay Head Indian descendants.

The Wampanoag Indian descendants have maintained a dispersed settlement pattern at Gay Head throughout history. In the past, communal endeavors and cooperative activity demanded greater communication and easy access to neighbors. A warren-like road system helped facilitate this communication.

Since the 1870's there has been a gradual disintegration of community cohesiveness and tribal organization. This breakdown was virtually complete by the 1930's. The loss of social cohesion was closely related to the economic shift from communal land holdings and communal work patterns to individual lands and competitive work systems. Communal agricultural and fishing activities disappeared almost completely by the 1930's. The reduction of the road system to four principal roads reduced the ease of physical access to neighbors and friends. The social focus thus shifted from communal group activities to immediate family and kin relations. The lack of commerical establishments or other informal meeting places for Gay Head Indian residents and the pattern of outmarriage to non-Indians and non-residents also contributed to the growing isolation of family units. This isolation, in combination with the dwindling Indian population and a clear shift in the Indian demographic concentration from on- to off-island, created a situation in which a substantial portion of Indian descendants no longer resided or participated in communal fashion at Gay Head.

Since the 1930's, the institutions which formerly provided for community cohesion and social contact have either disappeared or declined in importance. The post office closed in 1941 and the elementary school in 1966. The Baptist church has lost its social integrating function. Today, there is no establishment in Gay Head which serves as an informal meeting place where Gay Head Indians can visit. Neither is there any evidence of informal communication networks. Social ties are largely restricted to the nuclear family, and the off- and down-island Indian descendants do not maintain substantial ties with each other or with the individuals in Gay Head.

The Gay Head Indians do not have any events which are attended exclusively by their members. There are no community celebrations, homecomings, or other mechanisms for periodically renewing social relationships. The traditional Cranberry Day festivity, which has been observed annually each fall since at least the mid 19th century, is now attended by only a small number of members, consisting primarily of the group's leaders and their immediate families.

The Gay Head Indians maintain little social contact with each other outside of ties within immediate families. Neither do they have tribal institutions or events which serve to integrate the membership and maintain social contact. The decline in social cohesiveness was virtually complete by the 1930's, after communal economic activities and land-holding ceased, substantial migration off-island occurred, and the level of intermarriage within the group declined to almost none. While a small proportion of Indian families still reside within the historic Gay Head area, which is still identified as Indian, and some individuals are still identified as Gay Head Indians by non-Indians on the island, the absence of extensive social contact precludes the maintenance of tribal relations. We conclude, therefore, that the Gay Head Wampanoags do not meet the definition of community as required in criterion 25 CFR 83.7(b).

83.7(c) A statement of facts which establishes that the petitioner has maintained tribal political influence or other authority over its members as an autonomous entity throughout history until the present time.

Aboriginal Wampanoag leadership was provided by an hereditary chief or sachem who made decisions in consultation with a council of male elders, war captains (known as "pinesses") and spiritual advisors (who were called "powwows"). In the pre-contact period—prior to 1642—Gay Head was one of four major sachemships on Martha's Vineyard. Nohtoasksaet was the sachem at Gay Head until about 1675. He was succeeded by his

son Mittark (1675-1683), who was succeeded by his son Joseph Mittark. No reference to the sachemship could be found after 1687, the year in which Joseph Mittark conveyed the Indian land rights at Gay Head to Governor Mathew Mayhew.

There is only one first-hand description of the political system or processes at work at Gay Head prior to 1827, and no well-defined leaders are apparent during the period from 1687 to 1870. However, there is evidence that the Gay Head Indians continued to maintain some political influence and authority over their members. These people periodically petitioned the General Court of the Province of Massachusetts Bay between 1691 and 1781, and the Corporation for the Propagation of the Gospel between 1711 and 1776. These petitions, which were most often generated by land problems or the actions of the colonial guardians, offer the only clues available regarding the nature of Gay Head political life in the 18th century. They suggest that the Indians may have acted as a general council, and that Christian spiritual leaders such as Zachariah Howwaswee may have also served as the political leaders of the community.

The State of Massachusetts imposed a guardian system over the Gay Head Indians between 1781 and 1814, and in 1785 group member Zachariah Howwaswee was appointed one of the guardians. As wards of the State, the Indians continuously petitioned the state legislature between 1785 and 1870. State records acknowledge that between 1814 and 1862, the Indian descendants at Gay Head had no state-appointed guardians and were essentially self-governing. Despite the autonomy of this so-called Indian "plantation," there is evidence that its governing structure was similiar in many respects to other small Massachusetts towns. In 1862 the State imposed greater jurisdictional control over Gay Head by establishing it as an Indian district. An Indian district was viewed by state authorities as a transitional stage between plantation status and incorporation as a town, as well as between wardship for the Indians and citizenship. Full state citizenship was extended to the Gay Head Indians in 1869, despite the objections of their elected spokesmen. In 1870 the state incorporated Gay Head as a township, reportedly with the support of the majority of its Indian residents.

The precise nature of the town government between 1870 and 1955 is not known because the records of town proceedings no longer exist. The group's acknowledgment petition maintains that after incorporation in 1870 the "imposed" town governmental structure was adopted by the Indians as their governing body, so that in effect the town and the Indian government were one and the same until 1972, the year in which the Wampanoag Tribal Council was formed. However, the existing sources indicate that in substance and form this local government was indistinguishable from that of any other small New England town. Its focus was entirely on routine civil matters, and it took no official actions which might be interpreted as primarily benefiting the Gay Head Indians as a tribal group. It did not, for example, define or regulate group membership. There is some evidence, in fact, that it actually spurned Indian activities and identification and rejected formal alliances with other Indian groups and communities. Neither were its officers exclusively of Gay Head Indian descent. Between 1870 and 1972, at least 34 of the individuals elected or appointed to town offices were not Gay Head Indian descendants, although most were married to Gay Head Indians. Because there is no record of established membership criteria during this period, it is not known if spouses would have been considered members: some non-Indian spouses were admitted to tribal membership prior to 1870, but only Gay Head Indian descendants are currently eligible for membership. All of the town selectmen elected to office during this period were Gay Head Indians and group members have continued to constitute the leadership of the town government since 1972, the year in which the Wampanoag Tribal Council was formed.

While there is convincing evidence that group kinship ties played a crucial role in this local government, the town structure would have made for a peculiar kind of tribal governing body. Unlike any other tribal government, the town government was mandated by state law to accept legal responsibility for all residents of the township. This came to include an increasing number of non-Indians. The proportion of non-Indian residents grew from 13 percent in 1920 to 47 percent by 1970. At the same time, as a municipal polity, the local government had no legal authority outside of the town boundaries. Therefore, it could not legally maintain jurisdiction over the significant number of Gay Head Indian descendants who resided elsewhere, either permanently or temporarily (the resident Indian population decreased by 61% between 1900 and 1970). However, those non-residents who still held property or paid taxes in the town may have been affected by local government actions. State law also restricted the political participation of non-residents, since those Indian descendants who did not maintain residence at Gay Head at least part of the year were not entitled to vote there, either in the town meetings or during the general elections. Neither was any evidence found to indicate that the town officials exerted any informal political influence or control over the non-resident Gay Head Indian descendants, or that the non-residents participated in the political process within the town.

Again, because there is no record of established membership criteria during this period, it is not known if the non-resident Indian descendants were considered members. In 1807 non-residents were considered members. By 1861, however, they were generally excluded from claiming tribal rights such as land allotments. Since the formation of the Wampanoag Tribal Council of Gay Head in 1972, non-residents have comprised the vast majority of the group's membership.

Anthropologist Gloria Levitas, who conducted the most extensive enthnographic investigation of Gay Head, has concluded that with the imposition of town status upon their community in 1870, the Gay Head Indians lost their political autonomy as a tribal group. In 1934 the ethnologist Gladys Tantaquidgeon, in a special report to the Commissioner of Indian Affairs, identified the Aquiniah Council and not the town officers as representing the "tribal government" at Gay Head. The Aquiniah Council was the Gay Head affiliate of the Wampanoag Nation, a pan-Indian organization formed by the Indians at Mashpee, Massachusetts (on Cape Cod) in the late 1920's. In 1935 the Aquiniah Council was replaced by the Howwaswee Council, a local organization formed to compete rather than cooperate with the Wampanoag Nation.

There is no evidence that sustained political influence or authority was maintained in the community outside of the town government through any other formal or informal group process or structure. Neither does the group's petition make such a claim. The Aquiniah Council, identified by Tantaquidgeon as representing the "tribal government" in 1934, was soon replaced by the Howwaswee Council. The role of this latter council and its successor, the Pawkunnawakutt Council, which continued to exist in some form until 1972, was almost purely ceremonial. It is not known how much support these councils received from the community as a whole or from the larger group membership. The early membership of the Howwaswee Council was dominated by only two families, and some of its officers were not Gay Head Indian descendants.

The various civic organizations founded at Gay Head since the 1940's (the Aquinnah Club, the Gay Head Civic Association, the Gay Head Improvement Association, the Gay Head Community Council, and the Gay Head Taxpayers Association) have had some political impact within the community. However, all of these organizations have had limited objectives. They have all therefore been relatively short lived, many have had non-Indian support and membership, and none can be interpreted as being a tribal

governing body. As a pan-Indian leader and political maverick, Lorenzo D. Jeffers, who founded most of the local civic improvement organizations, exercised some influence and authority within the community and outside the town government. Yet, because his positions were often controversial and erratic, he did not muster enough support on a continuing basis to be considered a legitimate political leader of the Gay Head Indians.

The group's acknowledgment petition maintains that in 1972 the Wampanoag Tribal Council of Gay Head replaced the town government as the governing body of the Gay Head Indians. This council now claims to maintain political influence and authority over its 521 members. Yet, the town government did not change perceptibly in either form or actions from what it had been or done prior to the formation of the Tribal Council. Although non-Indians came to hold more town offices, the local government continued to be led by Indian descendants, many of whom were close relatives of the leaders of the Tribal Council.

Since its inception in 1972, the Wampanoag Tribal Council of Gay Head has elected officers, established by-laws and a membership roll, recorded its proceedings, and audited its finances. It has also directed a number of economic development projects; spearheaded group activities related to a land suit, a negotiated land settlement, and its petition for Federal acknowledgment; coordinated various community and group projects; and served as a liaison between its members and other agencies and organizations.

However, our research indicates that this organization does not have a substantial base of support in its claimed membership, either in Gay Head or elsewhere. The Tribal Council has not succeeded either in creating interest in the issues defined by its leadership as being important or in promoting attendance and participation in group activities. An analysis of political participation during the last five years reveals that not more than 22 members have attended any one of the annual meetings, and that a total of only four non-resident Gay Head Indians attended the annual meetings during this period. Two of the last five annual meetings have not had the established quorum of 15 members. Likewise, the quorum of 15 was only reached at about one-third of the 31 regular council meetings held between September of 1979 and March of 1985: the average attendence for these meetings was 14. The majority of those in attendance at these meetings were members of the president's family.

Communication from the group's leadership to its members is largely through the use of newsletters. No evidence was found that the business conducted at the council meetings was communicated through informal visitation or telephone networks. A sampling of group members who do not reside in Gay Head revealed that they knew little about the Council's activities; some did not even know that they were claimed as members or that their names were on the roll, although they offered no objections upon discovering this.

In contrast to the low participation and interest in Tribal Council affairs, the Indian descendants at Gay Head are not politically apathetic about town issues. Most of the eligible Indian voters attend the annual town meetings and vote in town elections. Indian candidates also continue to be elected to the three positions of selectman, although those elected since 1972 have had broad support in the town. These selectmen have represented the town as a whole and not just their Indian constituents. There is little evidence that they have voted along ethnic lines.

The Gay Head Wampanoags have not maintained tribal political influence or other authority over their members as an autonomous entity throughout history. Thus, we conclude that the petitioner does not meet the criterion established in 25 CFR 83.7(c).

83.7(d) **A copy of the group's present governing document, or in the absence of a written document, a statement describing in full the membership criteria and the procedures through which the group currently governs its affairs and its members.**

The petitioning group submitted a copy of their present governing document adopted by the group on February 12, 1977. The governing document includes the procedures through which the group governs its affairs and its members and the criterion currently being used to determine eligibility for membership. The group also submitted the minutes of a general meeting of the membership held on March 3, 1980 which reaffirmed the membership criterion stated in the governing document. Therefore, we conclude that the Gay Head Wampanoags meet criterion 83.7(d) of the regulations.

83.7(e) **A list of all known current members of the group and a copy of each available former list of members based on the tribe's own defined criteria. The membership must consist of individuals who have established, using evidence acceptable to the Secretary, descendancy from a tribe which existed historically or from historical tribes which combined and functioned as a single autonomous entity.**

A membership list dated May 1, 1983, was submitted with the Gay Head Wampanoag petition. This list was subsequently updated by a list dated June 1, 1985. For acknowledgment purposes, the total number of living members as of June 1, 1985, was 521. Seven former lists of members compiled in the 1970's and early 1980's were also submitted containing essentially the same family lines.

Ninety-eight percent of the group's members can demonstrate that they meet the group's membership criterion, i.e., that they descend from a Gay Head Wampanoag who appears on a census of the inhabitants of Gay Head, Massachusetts, published in 1871. Although the group has not attempted to trace their ancestry any further back than the 1871 census, there is documentary evidence to establish ancestry from the 1871 ancestor back to Gay Head Indians who appear on a list prepared in 1792. Evidence to connect the group's 1871 ancestors with the Gay Head Indians of 1792 was found in the personal notes of Richard L. Pease who was appointed by the Commonwealth of Massachusetts in 1866 to determine the boundaries of severalty-owned and common land at Gay Head. Supporting evidence was found in land records of Dukes County, Massachusetts, vital records, and published material. This evidence also suggests that several of the 1792 ancestors were the descendants of the aboriginal inhabitants of the area at the time of English colonization. We conclude that the Gay Head Wampanoags meet criterion 83.7(e) of the regulations.

83.7(f) **The membership of the petitioning group is composed principally of persons who are not members of any other North American Indian tribe.**

The members have no Indian ancestry that would make them eligible for membership in any federally recognized Indian tribe. Although in recent generations there have been instances where the group's members have married members of federally recognized tribes, descendants of these unions have not been enrolled as members of the petitioning

group. Therefore, we conclude that the Gay Head Wampanoag membership is composed principally of persons who are not members of other North American Indian tribes and that the group meets criterion 83.7(f) of the regulations.

83.7(g) The petitioner is not, nor are its members, the subject of congressional legislation which has expressly terminated or forbidden the Federal relationship.

The Gay Head Wampanoags do not appear on the Bureau's official list of "Indian Tribes Terminated from Federal Supervision." No legislation is known to exist which terminates or forbids a Federal relationship with this group or its members. Therefore, the Gay Head Wampanoags meet criterion 83.7(g).

ETHNOHISTORICAL REPORT ON THE GAY HEAD WAMPANOAG

The Wampanoag Tribal Council of Gay Head, Inc., is based in the township of Gay Head, Massachusetts. Gay Head is one of the three peninsulas situated at the westernmost tip of Martha's Vineyard, the largest island in New England, which lies in the Atlantic Ocean, approximately five miles off the southern coast of Cape Cod. The Indian name for this part of the island is "Aquinnah," which is said to mean "Place of the rising ground." The English named it Gay Head because of its distinctively high and multi-colored clay cliffs.

SUMMARY OF EVIDENCE

The Wampanoag Tribal Council of Gay Head, Inc., has only been in existence since 1972. Nonetheless, documentary sources clearly and consistently identify a group of Wampanaog Indian descendants as having lived in the general vicinity of the Gay Head peninsula, on the westernmost tip of the island of Martha's Vineyard, Massachusetts, from 1642, when Englishmen first settled the island, to the present. The identification of a Wampanoag tribal entity at Gay Head was established in the colonial records of Governors Thomas Mayhew, Sr., and Mathew Mayhew (1642-1691) and in those of the Province of Massachusetts Bay (1691-1781). An Indian tribal identification was also confirmed by church records, including those of the local Baptist church organized in 1693, and in the records of two religious societies: the Corporation for the Propagation of the Gospel in New England, which maintained some control over the Gay Head Indians between 1711 and 1776; and the Society for the Propagation of the Gospel Among the Indians, which provided financial support for the Baptist ministry at Gay Head from the early 1800's until at least 1870.

Inhabitants of the Gay Head peninsula have consistently been identified as Indians or people of Indian descent in the legislative and judicial records of the Commonwealth of Massachusetts from 1781 to the present. However, the State did not officially recognize the existence of a tribal entity at Gay Head between 1870, the year in which Gay Head was incorporated as a township, and 1976, when the Wampanoag Tribal Council was recognized by the Governor as the governing body of the Gay Head Indians.

Gay Head Wampanoag descendants have also been similarly identified as Indians in certain records of the United States Government beginning in 1799, when a Federal lighthouse was established at Gay Head. Indian descendants constituted the majority population at Gay Head on Federal census records compiled between 1870 and 1970, and on local censuses as early as 1792. Federal records also indicate that Indians from Gay Head were enlisted as surfmen in the U.S. Life-Saving Service (Coast Guard) after 1895, and enrolled at the Carlisle Indian Industrial School in Pennsylvania between 1905 and 1918. More recently, Federal agencies such as the Department of Health and Human Services have provided project funds to the Gay Head Wampanoags based on their identification as Indian. People at or from Gay Head were likewise positively identified as being members of an Indian group in traveler's accounts, local and regional histories, and travel guides; by anthropologists, historians, and other scholars; and in newspapers and other media.

The Wampanoag Tribal Council of Gay Head is based on land which was traditionally and aboriginally Wampanoag. The area which now comprises the town of Gay Head has been viewed consistently throughout history as an Indian community or, more precisely since the late 18th century, as a community of "Indians and people of colour." This perception of it continues today, despite the fact that non-Indians now constitute the majority of its population. For much of its history the Gay Head community was accorded a special status by church and governmental officials because of its distinct Indian population.

The Gay Head Indians have continuously identified themselves as Wampanoag throughout history and have most often been referred to as Indians by the other residents of Martha's Vineyard, although some have tended to perceive them as being Black rather than Indian. The Gay Head people are the only population on the island which has retained an Indian identity. Because the Gay Head Indian descendants were regarded as subordinate to Whites in the social hierarchy of the Vineyard, they were subjected to racial prejudice and segregation. Social contacts were largely restricted to other Indian descendants, Blacks from down-island communities, and, more recently, with Whites from off-island. Those Gay Head Indians who intermarried with Blacks or had Black ancestry were still generally regarded as being Indians as long as they remained on the island. However, many Gay Head Indians who moved off-island found that their Indian identity was questioned by Whites, Blacks, and even other Indians.

Since at least 1807, a substantial portion of the Gay Head Indian descendants have not resided in Gay Head or any other Indian community. In that year James Freeman fround approximately 41 percent of the Gay Head Indians to be absent from the Gay Head peninsula. The resident Indian population of the town of Gay Head declined by approximately 61 percent between 1900 and 1970. The current resident Indian population of 78, which has remained fairly stable over the past 40 years, represents only about 15 percent of the total membership of the Wampanoag Tribal Council of Gay Head. Not enough evidence has been found to conclude that cohesive tribal relations have been maintained since at least the 1930's, either within the local community or between the those resident at Gay Head and the ever-growing number of non-resident Gay Head Indian descendants.

Aboriginal Wampanoag leadership was provided by an hereditary chief or sachem who made decisions in consultation with a council of male elders, war captains known as "pinesses," and spiritual advisors who were called "powwows." In the pre-contact period (prior to 1642), Gay Head was one of four major sachemships on Martha's Vineyard. Nohtoaksaet was the sachem at Gay Head until about 1675. He was succeeded by his son Mittark (1675-1683), who was in turn succeeded by his son Joseph Mittark. No reference to the sachemship could be found after 1687, the year in which Joseph Mittark conveyed the Indian land rights at Gay Head to Governor Mathew Mayhew.

There is only one first-hand description of the political system or processes at work at Gay Head prior to 1827. However, there is evidence that the Gay Head Indians continued to maintain some political influence and authority over their members. These people periodically petitioned the General Court of the Province of Massachusetts Bay between 1727 and 1781, and the Corporation for the Propagation of the Gospel between 1711 and 1776. These petitions, which were most often generated by land problems or the actions of the provincial

guardians, offer the only clues available regarding the nature of Gay Head political life in the 18th century. They suggest that the Indians may have acted as a general council, and that Christian spiritual leaders such as Zachariah Howwaswee may have also served as the political leaders of the community.

The State of Massachusetts imposed a guardian system over the Gay Head Indians between 1781 and 1814, and in 1785 a group member named Zachariah Howwaswee was appointed one of the guardians. As wards of the State, the Indians continuously petitioned the Massachusetts legislature between 1785 and 1870. State records acknowledge that between 1814 and 1862, the Indian descendants at Gay Head had no state-appointed guardians and were essentially self-governing. Despite the autonomy of this so-called Indian "plantation," there is evidence that its governing structure was similar in many respects to other small Massachusetts towns. In 1862 the State imposed greater jurisdictional control over Gay Head by establishing it as an Indian district. An Indian district was viewed by state authorities as a transitional stage between plantation status and incorporation as a town, as well as between wardship for the Indians and citizenship. Full state citizenship was extended to the Gay Head Indians in 1869, despite the objections of their elected spokesmen. In 1870 the state incorporated Gay Head as a township, reportedly with the support of the majority of its Indian residents.

The precise nature of the town government between 1870 and 1955 is not known because the records of the town proceedings no longer exist. The group's acknowledgment petition maintains that after incorporation in 1870 the imposed town governmental structure was adopted by the Indians as their governing body, so that in effect the town and the Indian government were one and the same until 1972, the year in which the Wampanoag Tribal Council was formed. However, the existing sources indicate that in substance and form this local government was indistinguishable from that of any other small New England town. Its focus was entirely on mundane civil matters and there was nothing distinctively tribal or Indian about any of its official actions. It did not, for example, define or regulate group membership or take action to assert an Indian identity. There is some evidence in fact that it actually spurned Indian activities and identification and rejected formal alliances with other Indian groups and communities. Neither were its officers exclusively of Gay Head Indian descent. At least 34 of the individuals elected or appointed to town offices between 1870 and 1972 were not Gay Head Indian descendants, although most were married to Gay Head Indians. However, all of the town selectmen elected to office during this period were Gay Head Indians, and group members have continued to constitute the leadership of the town government since 1972, the year in which the Wampanoag Tribal Council was formed.

While there is convincing evidence that group kinship ties played a crucial role in this local government, the town structure would have made for a peculiar kind of tribal governing body. Unlike any other tribal government, the town government was mandated by state law to accept legal responsibility for all residents of the township. This came to include an increasing number of non-Indians. The proportion of non-Indian residents grew from 13 percent in 1920 to 47 percent by 1970. At the same time, as a municipal polity, the local government had no legal authority outside of the town boundaries. Therefore, it could not legally maintain jurisdiction over the significant number of Gay Head Indian descendants who resided elsewhere, either

permanently or temporarily (the resident Indian population decreased by 61% between 1900 and 1970), although those non-resident Indians who still held property or paid taxes in the town may have been affected by local government actions. State law also restricted the political participation of non-residents, since those Indian descendants who did not maintain residence at Gay Head at least part of the year were not entitled to vote there, either in the town meetings or general elections. No evidence was found to indicate that the town officials exerted any informal political influence or control over the non-resident Gay Head Indian descendants, or that the non-residents participated in the political process within the town.

Anthropologist Gloria Levitas, who conducted the most extensive ethnographic investigation of Gay Head, has concluded that with the imposition of town status upon their community in 1870, the Gay Head Indians lost their political autonomy as a tribal group. In 1934 the ethnologist Gladys Tantaquidgeon, in a special report to the Commissioner of Indian Affairs, identified the Aquiniah Council and not the town officers as representing the "tribal government" at Gay Head. The Aquiniah Council was the Gay Head affiliate of the Wampanoag Nation, a pan-Indian organization formed by the Indians at Mashpee, Massachusetts (on Cape Cod) in the late 1920's. In 1935 the Aquiniah Council was replaced by the Howwaswee Council, an organization formed at Gay Head to compete rather than cooperate with the Wampanoag Nation.

There is no evidence that sustained political influence or authority was maintained in the community outside of the town government through any other formal or informal group process or structure. Neither does the group's acknowledgment petition assert such a claim. The Aquiniah Council identified by Tantaquidgeon as representing the "tribal government" in 1934, was soon replaced by the Howwaswee Council. The role of this latter council and its successor, the Pawkunnawakutt Council, which continued to exist in some form until 1972, was almost purely ceremonial. It is not known how much support these councils received from the community as a whole or from the larger group membership. The early membership of the Howwaswee Council was dominated by only two families, and some of its officers were not Gay Head Indian descendants.

The various civic improvement organizations founded at Gay Head since the 1940's (the Aquinnah Club, the Gay Head Civic Association, the Gay Head Improvement Association, the Gay Head Community Council, and the Gay Head Taxpayers Association) have had some political impact within the community. However, all of these organizations have had limited objectives and have therefore been relatively short lived, many have had non-Indian support and membership, and none could in any way be interpreted as being a tribal governing body. As a pan-Indian leader and political maverick, Lorenzo D. Jeffers, who founded most of the local civic improvement organizations, excercised some influence and authority within the community and outside of the town government. Yet, because his positions were often too controversial and erratic, he did not muster enough support on a continuing basis to be considered a legitimate political leader of the Gay Head Indians.

The group's acknowledgment petition maintains that in 1972 the Wampanpoag Tribal Council of Gay Head replaced the town government as the governing body of the Gay Head Indians. This council now claims to maintain political influence and authority over its 521 members. Yet, the town government did not change perceptibly in either form or actions from what it had been prior

to the formation of the Tribal Council. Although non-Indians came to hold more town offices, the local government continued to be led by Indian descendants, many of whom are close relatives of the leaders of the Tribal Council.

The Wampanoag descendants at Gay Head have been identified throughout history as being American Indians, and Gay Head has been consistently viewed as being an American Indian community. For nearly two centuries, however, a substantial portion of the Gay Head Indians have not resided in this community. There is not enough evidence to conclude that cohesive tribal relations have been maintained throughout history, either within the community or between the core group at Gay Head and the growing number of non-resident Indian descendants. Neither has enough evidence been found to indicate that tribal political influence or other authority has been maintained continuously over the Gay Head Indians since 1870.

THE ABORIGINAL CULTURE PRIOR TO 1642

The Wampanoag were one of the principal aboriginal tribes of New England. Prior to European settlement, these Algonquian-speaking people were concentrated on a peninsula on the eastern shore of Narragansett Bay in what is now Bristol County, Rhode Island and the adjacent parts of Bristol County, Massachusetts. From this base the Wampanoag controlled much of the southeastern Massachusetts territory extending from the Bay to the Atlantic Ocean, including the islands of Martha's Vineyard and Nantucket. At one time they also held the Rhode Island portions of Narragansett Bay, but this was taken from them by their traditonal enemy, the Narragansett, who occupied the western shore of the Bay (Hodge 1971:II:903).

Archeological evidence indicates that Indians were present on Martha's Vineyard as early as 2270 B.C., but the earliest known Wampanoag site there dates from around 1565 A.D. (Levitas 1980:71; Rithchie 1969). It is not known if any of the successive tribal groups who occupied the island prior to the 16th century were the ancestors of the present-day Wampanoag (Levitas 1980:74-75). Wampanoag culture was similar to that of other Algonquian-speaking peoples. The village was the basic sociopolitical and subsistence unit. These non-permanent communities consisted of several interrelated families. Ownership of land and other possessions was commonly based on the family unit, but individual ownership was also recognized. Leadership was provided by an hereditary chief or sachem, who made decisions in consultation with a council of male elders, war captains known as "pinesses," and spiritual leaders who were called "powwows" (Salwen 1978:166-167; Simmons 1976:220-221; Marten 1970:18). While in theory the Wampanoag were united into a single federation in which each local sachem owed allegiance to a more inclusive sachem, in practice centralized authority was merely symbolic and local communities were autonomous (Scaglion 1977:44). Nevertheless, the island Indians were enmeshed to some degree in the social and political world of the mainland Wampanoag (Levitas 1980:92).

Just prior to the English occupation of Martha's Vineyard in 1642, the island was divided socially and politically into four major sachemships, of which Gay Head or Aquinnah was one (Scaglion 1977:74). The best estimates of the pre-contact population suggest that there were as many as 3000 Wampanoag on the island at that time and that several hundred of these Indians were under the Gay Head sachem (Ibid.:47). While it is assumed that Gay Head was similar in most respects to the mainland Wampanoag villages, there are no first-hand descriptions of its political system during the early historical period.

The Wampanoag Indians at Gay Head possessed a unique set of beliefs in a mythological giant named Moshop, who was the hero of many origin stories about Martha's Vineyard and whose exploits are thought to account for many of the natural phenomena on the island. An early contact form of the Moshup legends, as told by Thomas Cooper, a half-blood Gay Head Indian, was first published in 1792. Although the stories have been altered and embellished over the years, a group member reported in 1973 that most Gay Head people continue to believe in these legends (Scaglion 1974:20-25; Vanderhoop 1973:44).

COLONIZATION AND CONVERSION, 1642-1682

The earliest contacts between island Indians and Europeans are not known precisely. The English navigator Bartholomew Gosnold is generally credited with the European discovery of Martha's Vineyard in 1602, although Norse and Italian explorers may have made prior landings on the island (Banks 1966:I:58-59,64-66).

In 1611 an Indian named Epanow, who may have been either the sachem at Gay Head or a member of the sachem's family, and another individual named Coneconam were kidnapped by two English sea captains, Edward Harlow and Nicholas Hobson, and transported back to England. The Indians convinced Sir Ferdinando Gorges that there was gold on Martha's Vineyard. He outfitted an expedition to the island in 1614, for which Epanow and Coneconam served as guides. When the ship made its landfall, the Indians escaped. Five years later, Gorges dispatched Captain Thomas Dermer to explore the area. Dermer subsequently became involved in a skirmish with Epanow and suffered a fatal wound. This episode marked the last instance on Martha's Vineyard in which blood was shed between Indians and Whites (Attaquin 1970:34; Smith 1912:651; Banks 1966:I:67-70).

The English colonization of what is now Massachusetts began with the Pilgrim landing at Plymouth in 1620, and after 1630 there was a great influx of settlement into the Boston area. However, colonists were not attracted initially to Martha's Vineyard because of its sizeable Indian population and its relative isolation in case of native attacks. Around 1634 the Council for New England, which had held for 30 years a charter from the King of England to develop a vast region in America, decided to divide its remaining territory among its principal investors. A hazy knowledge of the actual coastal geography led to conflicting claims to the Vineyard between Sir Ferdinando Gorges and William Alexander, the Earl of Sterling. Intent on establishing a colony on the island, Thomas Mayhew, Sr., a member of the legislature of the Massachusetts Bay Colony, negotiated a grant of title from both of these gentlemen in 1641. Banks states that he also obtained a release from "the aboriginal owners." However, the details of these transactions with the Vineyard natives were never recorded (Banks 1966:I:84).

Mayhew in turn granted lands to other colonists and in 1642 sent his son, Thomas Mayhew, Jr., to establish a settlement on the eastern end of the island at present-day Edgartown (Ibid.:84-85). This date thus marks the beginning of sustained contact between Euro-Americans and the Wampanoag of Martha's Vineyard.

An individual named Nohtoaksaet was the sachem at Gay Head during the early contact period (until 1675). By the time of the Mayhews' arrival, the Indians of Martha's Vineyard represented a remnant population. Epidemics in 1617 and 1622 had decimated the mainland Wampanoag and the growing power of the Narragansett precluded the island bands from fleeing to other coastal areas (Levitas 1980:134,198). Their own population declined rapidly after 1642, due largely to the spread of yellow fever and tuberculosis. By 1675 the native population of the island had been reduced to approximately 700. With the exception of Gay Head, the sachemships eventually ceased to be political units. Local remnant bands tended to migrate to Gay Head and to coalesce with the relatively large Wampanoag population there. Mayhew's grant did not extend to the area occupied by the Gay Head Indians, and he was expressly

forbidden by royal order from invading their jurisdiction, although he was required to lend assistance to them if needed. Since Gay Head was the farthest island village from the Mayhews' settlement, it was less subject to their influence. The natives there were also reported to be the most intransigent of all the Vineyard Indians (Scaglion 1977:47-48; Levitas 1980:134,146,198).

Thomas Mayhew, Jr., began preaching his Puritan Congregationalist doctrine to the Wampanoag on Martha's Vineyard soon after establishing his settlement. He enjoyed early success by converting promising young men who then trained to become ministers themselves. However, the people at Gay Head resisted his missionary efforts and were in fact among the last Indians in what became Massachusetts to accept Christianity. Prior to his taking leave for a voyage back to England in 1657, Mayhew held a service at Ahquanpachebotton or the Place on the Wayside on what is now the West Tisbury-Edgartown road. This proved to be his last ministration to the Indians, since his ship did not reach England and was never heard from again. The Indians came to revere the Place on the Wayside for its connection with Mayhew, and they raised a pile of stones on the spot where he had preached. Local tradition has it that whenever tribal members passed by they added new stones to the pile. In 1901 the island chapter of the Daughters of the American Revolution dedicated a bronze tablet which was placed in a large boulder donated by the Gay Head Indians, to commemorate this historic site (Banks 1966:I:228-231; Attaquin 1970:33; Vanderhoop 1973:39; Vanderhoop 1904).

Thomas Mayhew, Sr., continued the work of his ill-fated son and enjoyed his greatest missionary triumph in 1663 when he converted Mittark, the son of Nohtoaksaet, the sachem at Gay Head. Although the powwows exiled this young man from the community, he returned three years later and succeeded eventually in bringing all of the Gay Head people to a "profession of Christianity" (Banks 1966:I:7,20). His efforts were sustained by a series of Indian lay ministers and teachers, and by 1698 the Congregational meeting house at Gay Head claimed 260 congregants (Hare 1932:213-214).

At about this same time, the Puritan establishment at Gay Head began to be challenged by a growing number of Baptist followers. Led by a series of Indian preachers, the Baptist congregation organized in 1693 (the first on the Vineyard) became by 1750 the dominant church at Gay Head (Levitas 1980:161). It now holds claim to being the oldest Indian Baptist church in North America (Mayhew 1956:125).

For forty years (1642-1682), the elder Thomas Mayhew ruled Martha's Vineyard like a feudal lord. Although provisions were made for a formal government under a General Court of representatives in 1653, Mayhew remained firmly in control (Levitas 1980:118). The colonies of Maine, New York, and Massachusetts all claimed sovereign control over the island, but Mayhew's title was confirmed and he was appointed governor of the Vineyard for life by New York Governor Francis Lovelace in 1671 (Banks 1966:I:147-149).

The Indians of Martha's Vineyard were inclined toward passivity in the face of colonization, perhaps because of their isolation from mainland allies, their fear of English power, and the effects of white mans' disease on their culture.

In 1662 a Rhode Island merchant named William Brenton purchased title to Gay Head from Womsutta, a mainland sachem who was the son of Massasoit and the elder brother of King Philip, the most famous of the Wampanoag leaders. Brenton's deed was duly recorded in New York, but he never took up residenc on the island, perhaps because the local sachem Nohtoaksaet refused t recognize this conveyance by a mainland chief (Banks 1966:I:7; Attaquin 1970:35).

Nohtoaksaet died sometime prior to 1675 and his younger son Mittark succeeded him as sachem of Gay Head in the absence of Ompohhannut, an elder brother. In 1675 Ompohhannut returned to claim the sachemship and a portion of the Gay Head land base as his birthright. Mittark, his counselors, and the common men of Gay Head worked in consultation to appoint a twelve-man jury to resolve these claims. All of the Vineyard sachems as well as people from the mainland were called upon to give testimony before this "General Court." Following these deliberations, the jury upheld Ompohhannut's right of succession and his entitlement to one-quarter of the Gay Head lands (Banks 1966:II:7-8). A written statement of this finding was deposited with the Dukes County deed records. This rare document provides the only description of political processes operative at Gay Head during the 17th century.

Ompohhannut never returned to Gay Head and it has been speculated that he may have been precluded from doing so by King Philip's War. This conflict began in the summer of 1675 when an influential Wampanoag sachem named Philip launched an attack against Puritan villages which soon escalated into a two-year war that spread throughout New England. In the end, the series of battles between the confederated Wampanoag, Narragansett, Nipmuc, and Pocumtuck and the colonists and their Indian allies left "King" Philip, 3000 other Indians, and 600 English colonials dead. Half of the towns in New England were damaged an most of the region's Indian tribes were compelled to forfeit thei independence (Vaughan 1965:313-314).

The only significant effect King Philip's War had on Gay Head was to further isolate the community from the mainland Wampanoag (Levitas 1980:146). Despite the pleas of off-island relatives to join in the hostilities, the Indians on Martha's Vineyard pledged their loyalty to the English. Governor Mayhew made arrangements to employ an all-Indian foot company under Japheth Hannet to defend the island, and this policy served to maintain the peace. Hannet also served as a juryman in the Ompohhanutt claim and later succeeded Mittark as the native minister at Gay Head (Hare 1932:207-208; Attaquin 1970:35; Banks 1966:II:7-8; Vanderhoop 1904).

LAND CONVEYANCES, 1684-1690

Thomas Mayhew, Sr., died in 1682 and was succeeded as Governor by his grandson Mathew Mayhew. Mittark died the next year and was succeeded as the Gay Head sachem by his son Joseph Mittark. On October 20, 1684, this sachem conveyed by deed to Mathew Mayhew's brother John the neck of land known as Nashowaquidsee, which bordered Gay Head to the east (Mass. House 1856:6-7). Thomas Mayhew, another of Mathew's brothers, later reportedly purchased Squibnocket, another adjoining neck of land from "six sachems and six other Indians" (Ibid.).

In 1685 Governor Thomas Dongan of New York devised a plan to establish Martha's Vineyard as a manor with Mathew Mayhew as its lord, and then to purchase the title of Lord of the Manor from Mayhew, since Dongan could not invest himself with the title directly. This purchase also brought the territory of Gay Head within Dongan's possession (Banks 1966:I:174-177; Province of New York 1685).

On May 6, 1687, Mayhew, acting as Dongan's agent, purchased Indian title to Gay Head from sachem Joseph Mittark for £30. The resident Indians protested that this conveyance was in direct violation of a covenant drawn up by Mittark and some of his chief men in 1681, which declared that none of the lands under his sachemship could be alienated (Ibid.; Muttach 1681).

In his recent short history of Gay Head, Francis G. Hutchins has theorized that by this action Joseph Mittark quitclaimed his rights as overlord and abdicated his sachemship, thus "formally and actually terminating any tribal government at Gay Head" (Hutchins 1986:11). While this conveyance may well have ended the aboriginal Wampanoag form of government there, since no reference can be found to the sachemship after this date, subsequent evidence does indicate that the Gay Head Indians adopted other forms by which they continued to maintain influence and authority over their members independent of the control of any other Indian governing entity.

A manorial system was thus imposed on Gay Head and the Indians lost their land rights. Grants or leases of lands, usually in forty acre parcels, were made to various individual Indians in exchange for annual quitrents (token payments). In addition, the Indians as a group were compelled to pay a symbolic quitrent of ears of corn to the Lord of the Manor (Banks 1966:II:8-10). However, before Lord Dongan could create much mischief on the Vineyard, the "Glorius Revolution" in England overthrew King James and replaced him with a Protestant King and Queen, William and Mary. As an appointee of King James, Dongan soon lost his authority as Governor, although he continued to be the absentee landlord of Gay Head (Ibib. I:177-178).

UNDER THE PROVINCE AND "THE COMPANY," 1691-1781

The conflicting colonial claims to Martha's Vineyard were resolved once and for all in 1691 when the Crown detached the island from the jurisdiction of the Province of New York and placed it under the royal Province of Massachusetts Bay, which included the former colonies of Massachusetts Bay, Plymouth, and Maine. The Indians at Gay Head constantly complained to the new authorities about the illegality of Joseph Mittark's conveyance of Gay Head and Nashawaquidsee. As a result, the General Court (the legislative body) of the Province appointed a committee to investigate the matter in 1703. This committee concluded that Mittark's alledged covenant was a fraud after an Indian named Josiah Hosewit, who later became the Baptist minister at Gay Head, confessed that he had drafted the document sometime after Mittarks's death. The Indians at Gay Head, who continued to believe that the document was genuine, were not content with this decision. Two years later they convinced the General Court to order a rehearing. However, this second investigation reached the same conclusion (Ibid.:II:10-11). Yet, Levitas holds that the timing of the 1681 covenant and the fact that it was probably made in response to the claims of the off-island Wampanoag rather than an

English attempt to purchase land tends to support the authenticity of the document (Levitas 1980:147-148).

In his capacity as steward for the absentee landlord Dongan, Mathew Mayhew continued to grant or lease the land at Gay Head to the Indians. The English residents of neighboring Chilmark purchased these lease assignments for petty amounts or confiscated them as payment for business debts. This led to a great deal of tension between the races, as the Indians deeply resented the loss of their land base (Banks 1966:II:10).

The land problem at Gay Head was gradually brought to the attention of the Corporation for the Propagation of the Gospel in New England, which was also known as "The Company." This organization was a missionary society for work among the Indians which was created by the English Parliament in 1649 and funded by the wealthy and influencial men of Massachusetts (Levitas 1980:136). The Company managed in 1711 to secure title to Lord Dongan's holdings at Gay Head for £550. Although this purchase was made ostensibly "with the main design of benefiting the aboriginal natives," it merely continued to perpetuate the Indians' status as tenants on their own land. In 1714 the Company dug a ditch and erected a fence across Gay Head neck in order to exclude the public from the Indian community (Banks 1966:II:10-11).

Despite its altruistic pronouncements, the Company was determined nevertheless to gain some income from Gay Head and so permitted a Chilmark man named Ebenezer Allen to lease 600 acres of land there, including several Indian residences (Kellaway 1961:222). When Allen requested an additional 400 acres in 1724 (Allen 1724), the Indians complained vigorously. In light of this opposition and the continued protests against the open-ended leases arranged originally by Mathew Mayhew, the Company reached an agreement in 1727 whereby Abel Hosswit and nine other Gay Head Indian leaders agreed to release 800 acres of land in exchange for the Company's deed granting the remainder of the Gay Head land to the Indians for their sole use and undivided occupancy. This agreement contained a clause which provided that the Indians at Gay Head "shall always be under the direction, government, and stint of said Company" (CPG 1727; Banks 1966:II:11-12). This document was significant because it terminated the leaseholds which had resulted in a loss of land to the Gay Head Indians and gave the Indians a legal basis for their own occupation.

Members of the Indian community at Gay Head were inclined to make their grievances known to the Company by petitioning its commissioners in Boston. In 1738, for example, a number of Gay Head inhabitants requested the conviction of "several young men addicted to stealing sheep" and voted to have these young Indians punished by being deprived of their shares in the common land (CPG 1739).

In addition to being subject to the authority of the Company, the Indians at Gay Head were also considered to be wards of the Province of the Massachusetts Bay. In 1746, the colonial legislature, which was called the General Court, appointed three guardians to oversee the Indian lands on Martha's Vineyard (Province of Mass. Bay 1746).

The Gay Head Indians repeatedly petitioned the General Court, just as they had the Company commissioners, and it is these petitions which offer the only clues available regarding the nature of the Gay Head political system during the 18th century. The people at Gay Head brought complaints before the

General Court at least thirteen times between 1745 and 1767 (Province of Mass. Bay 1745a; 1745b; 1747a; 1747b; 1753; 1755a; 1755b; 1760; 1764; Proprietors of Gay Head 1747, 1749; Indian Inhabitants of Gay Head 1759; Indians of Gay Head 1767). Most of these grievances were generated by land problems or the actions of the guardians.

Three of the signed general petitions, those submitted in 1747, 1749, and 1767, remain extant (Proprietors of Gay Head 1747, 1749; Indians of Gay Head 1767). Each of these contains the names of both men and women. A title is not listed for any of the signers except Zachary Hosswit (a.k.a. Zachariah Howwaswee), who is listed as being a clerk on the 1749 petition. Thus it is not possible to identify a primary leader, and there is nothing to indicate that the aboriginal political system of sachems, pinesses, and powwows had continued.

The 1747 petition includes the names of 38 "Indian Inhabitants, Proprietors, and Owners" (Proprietors of Gay Head 1747), or approximately 28 percent of the total Indian population of 112 as counted by the guardians in that same year (Guardians for the Indians in Dukes County 1747). Since this number might reasonably approach the total adult population, it suggests that the Indians may have acted as a general council, at least for the purpose of petitioning the legislature. This is corroborated by the 1749 petition which contains 33 names and begins by stating that "The Poor Indian Proprietors of Gay Head met together and by a vote made this Humble petition" (Proprietors of Gay Head 1749).

The most prominent leader at Gay Head, at least as reflected in the meager colonial documents, was Zachary Hosswit (Howwaswee), who signed the 1747 and 1749 petitions and who was appointed by the General Court to be one of the three Vineyard guardians in 1774 (Province of Mass. Bay 1774). Hosswit was very much a part of the Protestant establishment at Gay Head, having been employed by the Company as a magistrate as early as 1733, and later as a schoolmaster and preacher (CPG 1729-1787). This suggests that the spiritual leaders in the community, perhaps in the tradition of Mittark, continued to have considerable political influence if not authority.

UNDER THE COMMONWEALTH, 1781-1814

The activities of the Company at Gay Head began to lapse as the American Revolution approached. Following the war, the British-based benevolent society found it expedient to shift its operations to Canada. Although the Company never formally conveyed its rights to Gay Head, the new state of Massachusetts assumed immediate jurisdiction over both its property and the Gay Head Indians after the independence of the United States was recognized (Banks 1966:II:13-14). In the early 19th century, a Society for the Propagation of the Gospel Among the Indians, which proposed to take over some of the functions of the old Company, was founded in America. The "Society," as it was popularly known, continually provided funding for the Baptist ministry at Gay Head.

In describing the state's relationship to the Gay Head Indians between the Revolutionary War and 1862, when Gay Head became an Indian District, the Massachusetts Supreme Judicial Court held that

> the Indians and people of color constituting the 'Gay Head Tribe'. . . were in a certain sense wards of the Commonwealth, over whose property and persons supervision was excercised from time to time, and for whose protection against the dangers arising from improvidence and incapacity specific enactments were made (Mass. Supreme Judicial Court 1866:135).

During the period after the last guardians were appointed, the court observed that the Gay Head Indian proprietors "managed their own affairs, as well as those of a municipal as of a private nature" (Ibid.: 136). Yet Gay Head was never included within the limits of any township and full state citizenship was not extended to its Indian residents until 1869. As "involuntary wards of the State" they could not sell their land except to other Indians Of Gay Head, make binding contracts, or sue or be sued in the courts (Pease 1871:21).

Membership in the group was based solely on kinship. To be eligible one had only to descend from a Gay Head Indian. This ancestry could be either matrilineal or patrilineal (Ibid.). During certain periods of the group's history, non-Indian spouses and Indian spouses from other groups were accepted as Gay Head Indians (see Genealogical Report).

The Massachusetts legislature attempted to continue the guardian system, making its first appointments in 1781 (Mass. Resolves 1781), and Indians Of Gay Head continued to petition the General Court, as they did in 1785 after becoming concerned about the alienation of their land base (Ibid. 1785). In that same year a group member named Zachariah Howwaswee, who was also the Congregational minister at Gay Head, was appointed as one of the guardians (Ibid.).

In 1792 a group member named Moses Howwaswee conducted a census of Gay Head, which also included an estimation of individual blood quantums. This census shows a total resident population of 251, of which all but 15 were counted as "Natives." An analysis of the blood quantum estimates indicates that 46 percent of the Natives were full-blood Indians and that 54 percent were mixed-blood. Approximately 42 percent of the total Native population had some White ancestry and 28 percent had some Black ancestry. Among the 15 individuals who were considered as "Strangers Married Among Us," 4 were full-blood Indians of tribes or groups other than Gay Head, and 11 had one-half or more Indian blood (Howwaswee 1792).

These statistics indicate that a great deal of intermarriage had taken place in the century and a half since the Mayhews first settled the Vineyard. Intermarriage between Blacks and Indians was common in Massachusetts as early as the 17th century. According to the first authentic census of the Province, published in 1765, Dukes County, which was comprised of Martha's Vineyard, No Mans Land, and the Elizabeth Islands, contained 46 Blacks and 313 Indians (Woodson 1920:46).

There has been some speculation about the source of the Black population at Gay Head. One explanation is that former slaves who had shipped originally via the West Indies to work on the New England "plantations" had moved to the

island and intermarried (Levitas 1980:178). Another is that Blacks came to Gay Head as a result of the whaling industry. However, our genealogical research shows the Black ancestry to be more indirect.

In the latter half of the 18th century, a large proportion of the male Gay Headers shipped as mates aboard whaling ships, so many in fact that Indian whalers from any tribe or group came to be called "Gay Head" by their fellow crewmen. These men were highly regarded for their skill and daring and were favored by many captains as steersmen. Some Gay Headers eventually became first mates and a few even captained vessels between voyages (Poole 1968:122; Hohman 1928:50).

The whaling captains actively recruited for hands in ports throughout the world. Following the American Revolution, their crews began to contain a larger proportion of Blacks (Hohman ibid.). A recent study found that Black laborers comprised 8 percent of the whaling hands who shipped out of the neighboring island of Nantucket, the major New England fishery, between 1769 and 1776 (Vickers 1985:289).

Thus by its very nature the whaling industry probably brought seamen from all over the world to the ports of southeastern Massachusetts and increased the opportunities for intermarriage between "Natives" and "Strangers." The offspring of such unions at Gay Head were accepted as Indians and integrated into the community (Levitas 1980:178,204,251).

In 1796 the Commonwealth of Massachusetts recognized the autonomy of the Gay Head Indians by accepting the group's conveyance of a small tract of land to be used for the construction of a lighthouse (Mass. Resolves 1796). The State, in turn, conveyed this land to the United States, which erected the Gay Head Light in 1799. Shortly after assuming his duties as its first keeper, Ebenezer Skiff wrote his superior that "I have no neighbors here but Indians and people of colour" (Railton 1982a:104). He had previously been warned not to become a "retailer of ardent spirits" because it was feared that liquor would destroy the Indians (Ibid.: 95). In 1803 it was reported that Skiff's residence at the lighthouse was "about four miles from the nearest family of white people," and that he "had strictly conformed to the restriction respecting the retailing of ardent spirits" (Mayhew, et al. 1803).

The earliest extant description of the "great body of the Indians" at Gay Head was written by James Freeman in 1807. This writer noted that there were 142 "souls" resident there and about 100 absent; "some of whom are children put out to service in English families; and others whalemen." Of the Indians, Freeman noted nine men as being full-bloods and "still more of the women." The rest were described as being "intermixed, chiefly with negroes." They lived in "twenty-six framed houses and seven wigwams." Freeman noted further that every "native," whether resident or not, "is considered as a proprietor" and entitled to a land right in the common pasture (Freeman 1971:51).

In 1808 a church official named Elisha Clap wrote of the Reverend Zachariah Hosswit (Howwaswee): "I understand that his [Congregational] ministry. . . will soon become extinct. Only a few aged Indians, who do not understand English, attend his meeting, as he preaches in the native language. . . Mr. Jeffers, a Baptist, the other preacher in the place, draws most of the Indians. . . ." (Clap 1808).

Zachariah Howwaswee and nine other Indians Of Gay Head, referring to themselves as "the few remaining Indians of Gay Head," petitioned the General Court in 1811 for the appointment of "some good and down right honest" guardians to correct what they saw as a deteriorating social situation at Gay Head. They blamed the fact that the group no longer got along "peaceably and well" on the "Negroes and Mulattoes [who] got in among us" (The Few Remaining Indians of Gay Head 1811).

In response to this petition, the General Court passed the first of a series of Guardian Acts designed to better regulate the Gay Head proprietors. This 1811 act authorized the guardians to allot land to each Indian family and to leave the remaining lands for the support of the indigent. According to Ebenezer Skiff, the lightkeeper at Gay Head, who often served as an informal intermediary for the Indians, the Howwaswee petition was "fallacious" and the General Court's action was taken without consultation with the larger body of Gay Head inhabitants (Ebenezer Skiff 1823). When the others learned of this action they submitted their own petition refuting the claims of the Howwaswee group, whom they characterized as being "a party detached from us." As to the earlier petitioner's claim to being "the few remaining Indians at Gay Head," this petition pointed out that three of the signers were of mixed-blood origin while, by their count, there were more than 48 adults who were full-blood Indians and over 100 who "descended from the aboriginals" at Gay Head. It further described Howwaswee as an intemperate preacher and implied that in order to obtain liquor he had sold considerable land and had subsequently caused the Indians to be sued by a White man. Finally, the petition requested that the Governor affirm as guardians three men nominated by the group, all of whom were members of the non-Indian Mayhew family (Proprietors of Gay Head 1811).

SELF-GOVERNMENT, 1814-1861

The legislature apparently took no action on this petition, except to increase the powers of the guardians it had already appointed: authorizing them in 1813 to seize Indian livestock as payment for overdue rents (Mass. Acts 1813). The Gay Head Indians ignored the acts of 1811 and 1813 and continued to hold their lands in common. They also refused to recognize the authority of the guardians and eventually forced them to resign. Perhaps because of the remoteness of the Gay Head community, the State made no attempt to coerce the Indians into accepting its control. After 1814 it gave up on the idea of appointing guardians for Gay Head. As a result, the community was allowed to remain self-governing (Levitas 1980:173,175; Earle 1861:38-39).

Annual meetings were held at Gay Head at which leaders were chosen and issues regarding joint property were resolved. This local government also functioned to regulate the clay beds and the common pasture lands and to provide relief for the poor (Mass. Supreme Judicial Court 1866:130-131).

In 1823 the lightkeeper Ebenezer Skiff wrote that the community of Gay Head contained 2400 acres and that "There is no other Tribe of Indians within the Commonwealth that has kept the whole of its land as this Tribe has" (Skiff 1823). However, he also pointed out that "many artful plans have been contrived and many trials have been made to get some part of it out of their hands. . . ." Of the people themselves Skiff wrote that they were "a mixed

multitude of different colour" and that there were "but a few of the aboriginals" (Ibid.).

A special legislative committee studying the forms of Indian government in Massachusetts issued a report on Gay Head to the General Court in 1827. In describing the group government the committee wrote: "In respect . . . to their municipal affairs, the Indians have . . . assumed the business of self-government, and they now hold in their respective meeting or school houses, 'town meetings,' in which they choose a Clerk, Overseer of the Poor, [etc.] and audit with perfect regularity and sufficient intelligence all the accounts of the tribe . . . The women being proprietors, vote in like manner as the men." The report concluded that "The system of self-government which is thus in operation has so many advantages . . . that the Committee are decidedly of the opinion that it ought as far as practical to be retained . . ." (Mass. House 1827).

Perhaps as a result of this report, a Guardian Act passed in 1828, which severely limited the powers and activities of the Indian communities at Chappaquiddick and Christiantown, was never imposed on Gay Head (Mass. Acts 1828). The Gay Head Indians thus retained their independent political system, continued their isolationist policies, and only petitioned occasionally the General Court for support or relief. In 1838, for example, a petition signed by 53 Gay Head Indians requested that a law be enacted to prohibit the sale of liquor to Indians (Indians and People of Colour at Gay Head 1838). The next year a petition with 31 signatures requested that the legislature appropriate funds for the construction of a grist mill at Gay Head (Ibid. 1839). The General Court acted favorably on these petitions and passed enabling legislation in both cases (Mass. Acts 1838; 1839). Beginning in 1835, it also authorized appropriations for support of the Indian school at Gay Head (Ibid. 1835). This direct funding was continued by the legislature into the 1890s.

In 1839 the historian John Warner Barber wrote that Gay Head was "inhabited by descendants of the native Indians who own 2400 acres of land, most of which is under good improvement." "Within a few years," he continued, "the conditions of these people is much improved in point of temperance and general moral reformation. In this good cause, Simon Johnson and Zacheus Hauwassowee [sic] are actively involved" (Barber 1839). Zacheus Howwaswe was also the first signer of the 1838 and 1839 petitions, which may have been an indication of his political standing within the community.

Barber estimated the group population to be 235, and a special legislative committee counted 240 Gay Head Indians in 1838, approximately one-fourth of whom were reported to be employed as whalemen (Ibid.; Browne 1838). Thus the 53 individuals who signed the 1838 petition and the 31 whose names appeared on the petition of 1839 may well have represented the vast majority of the adult Indians present at Gay Head.

In 1840 Ellis Skiff, who had succeeded his father Ebenezer as the lightkeeper at Gay Head requested that the Federal Government purchase a right of way from the lighthouse to its only source of water, a reservoir which had been constructed 30 years earlier by the elder Skiff. "The distance is about a half a mile across fields belonging to the Indians and people of Colour," wrote the younger Skiff, "one of which has fenced in the spring and has commenced ploughing the land all around the spring" (Skiff 1840). It is assumed that such a right of way was obtained.

A special legislative committee conducted an investigation of Gay Head and reported its findings to the General Court in February of 1849. The committee found that the population consisted of 162 "native" members, 12 "foreigners," and 10 men who were "at sea" (Mass. House 1849:18). "For about thirty years," wrote the committee, "they have been without a guardian, and the division of their lands, and indeed the whole arrangement of their affairs, except of the school money, has been left to themselves" (Ibid.:20). Approximately 1900 of the 2400 acres of land at Gay Head was found to be held in common without benefit of a statutory title. The Indians had continued the tradition of allowing any member to appropriate for their own use as much of the improved common land as needed (Ibid.:18-20). "The most singular and creditable fact in connection with this," the committee observed, "is that, while one proprietor has but half an acre, and another has over a hundred acres, there is no heartburning, no feeling that the latter has more than his share" (Ibid.:21).

In regard to economic activities, the committee found that the Indians sold between 150 and 300 tons of clay each year from the Gay Head cliffs, and harvested 150 to 300 bushels of cranberries. "When the berries are in the proper state to be picked, notice is given to the whole tribe, and, on a certain day, all who wish, go and pick all they can, each being entitled to the gathering of the day" (Ibid.). The committee also found that approximately $235 was derived each year from pasture leases on the common lands and was "appropriated, under the direction of a committee, to public purposes, mainly to the support of the poor" (Ibid.).

There is evidence that by the 1850's the Gay Head Indians were electing three representative members to serve as "overseers" (guardians or spokesmen). In 1855 the three men who served in this capacity, Zacheus Howwaswee, Samuel Peters, and Aaron Cooper, petitioned the Commonwealth to survey the disputed boundary line between Gay Head and Chilmark (Howwaswee, et al. 1855). After a legislative committee appointed to investigate the matter concluded that the boundary first described in Mittark's deed of 1684 was valid (Mass. House 1956), the General Court officially delineated the Gay Head boundaries in 1856 (Mass. Acts 1856). In 1857 Isaac D. Rose, a non-Indian married to a Gay Head woman, served as the overseer (Overseers of Gay Head 1857).

An individual named John Milton Earle was directed by the General Court in 1859 to investigate the State's relationship with its Indians groups. In 1861 Earle submitted to the legislature the results of an extensive study on the social, political, and economic conditions of the Indians. Earle placed the Gay Head population at 204, of whom 10 were classified as "Foreigners," 12 were Indians born elsewhere who had intermarried, and the rest were "Natives." In addition, he found that there were 49 individuals who had moved from the Vineyard, primarily to New Bedford on the mainland, and who were therefore not recognized by the Natives "as having retained any rights, as members of the tribe" (Earle 1861:30-31).

Regarding the racial mixture of the community, Earle observed:

> The people of Gay Head, like those of the other plantations, are a mixture of the red, white, and black races. They have, also, an infusion of the blood of the chivalry of the South, as well as of the Portuguese and Dutch, as might be inferred from the names of Randolph, Madison, Corsa, Sylvin, and Vanderhoop being found among

> them. Nearly all of the young men, heretofore, have gone to sea, and many of them never return; some dying at sea, and others finding new homes in distant lands. The places of these are supplied by others, chiefly sailors, from abroad, who, getting acquainted with the Gay Head men at sea, come here, and marry Gay Head women, and settle here for life. By this continued efflux of native males, and influx of foreign males, the Indian names have almost become extinct, and but for two or three families, a list of their names would never suggest an idea of their aboriginal origin. The admixture is much like that of the other plantations, with, perhaps, a less infusion of the African than in some of them. A few are so strongly marked with Indian characteristics, as to induce the belief that they are very nearly of pure blood; but there are none so nearly white, as in some of the other tribes (Ibid.:34).

Earle not only found it remarkable that the land continued to be held in common without recorded titles or laws regulating transfer and descent, but also that the "whole civil polity of the tribe" was governed by its own independent law rather than those of the Commonwealth to which it was nominally subject. "This law is the unwritten tribal law," he observed, "which, from its apparently favorable working, is probably as well adapted to their condition and circumstances as any that can be devised. At any rate, they adhere to it with great tenacity, and are fearful of any innovations upon it" (Ibid.:33).

The local government which Earle described was similar in many respects to that of small Massachusetts towns: "The municipal organization consists, mainly, of three overseers, a clerk, treasurer, school committee, and committee on public lands, and by these their affairs are regulated and managed. The school committee performs the duties incident to such committees in the towns, and those of the prudential committee also" (Ibid.:40). Regarding Gay Head's relationship to the state government, Earle wrote: "The people have in former times, suffered so much from outward interference in their affairs, that they have become very fearful of it, and for that reason are always indisposed to make any want known to the legislature, lest it should be made the occasion of such interference" (Ibid.:37). Accordingly, he reported that the Indians had rejected the suggestion that they be enfranchised as citizens and incorporated as a town. Finally, Earle concluded that all knowledgable parties concurred in the belief "that the present relations of the tribe to the rest of the community, and to the State, should remain unchanged" (Ibid.:43). Nevertheless, he recommended that the traditional practices at Gay Head and the running of the school should be given legal sanction and authority, that those who voluntarily withdraw from the community be prohibited from claiming residency rights or returning for support, and that all marriages, births, and deaths should be registered (Ibid.:44-45).

DISTRICT STATUS, 1862-1870

Some of Earle's recommendations were implemented in an act passed by the General Court in 1862. Section 4 of this statute clarified the legal status of the local government by establishing Gay Head as a district, identical in standing to the district which had earlier been established for the Indians at Mashpee. Gay Head was thus incorporated as a municipality and its residents

were afforded municipal rights and privileges. This law restricted municipal voting to resident male Gay Head Indians and Indian men from other groups within the state who were married to Gay Head women. Non-Indian men married into the community were also permitted to vote if approved by two-thirds of the other legal voters. The acting clerk at Gay Head was authorized to designate a convenient time and place for organizing a district government. A clerk for the district was also charged with establishing and maintaining a roll of all Indians Of Gay Head, a register of all marriages, births, and deaths, and a record of all land holdings and conveyances (Mass. Acts 1862). Subsequent documents indicate that the voters of the district held annual meetings and elected a clerk, treasurer, and at least two selectmen (Mass. Supreme Judicial Court 1866:131; Cooper, et al. 1869). The man who served as the district clerk in 1869 was Isaac D. Rose, a non-Indian who had previously served as the Gay Head overseer in the late 1850s (Cooper, ibid.; Overseers of Gay Head 1857).

The 1862 act also extended the rights of full state citizenship to all Indians within the Commonwealth except those at Gay Head or on the state's other six "Indian Plantations." These excepted Indians could also gain the rights of citizenship, however, if they took up residence within a town, registered their intent with the town clerk, and paid a poll tax, thereby giving up their legal status as Indians (Ibid.).

In the legal evolution of Massachusetts communities, a district was considered a way station between plantation status and incorporation as a town. For Indians, it was also considered a transition point between wardship and citizenship (Hutchins 1986:64). As a "body corporate and politic," Gay Head now had the power to own, purchase, and convey land, to sue and be sued in court, to enter into contracts as a community, and to be indicted for crimes as a corporation. However, it did not have the power to raise taxes (Levitas 1980:211,215).

The imposition of district status on Gay Head augured profound changes for the community. By increasing the power of elected officials and denying women the right to vote, it disrupted the egalatarian traditions of the Indians. It also established the groundwork for terminating their communal system of land tenure by hastening the development of a system of codified laws and recorded deeds (Ibid.:214-215). This change was made evident in 1866 when the Massachusetts Supreme Judicial Court ruled that the District of Gay Head was not the legal successor to the Gay Head Indians and was not liable for any debts or demands which existed against the Indians prior to incorporation. The court further ruled that prior to 1862 the Indians were incapable of contracting a debt for which they could be held liable without the consent of their guardian, and the fact that they had no guardian did not make them competent to enter into contracts (Mass. Supreme Judicial Court 1866:129). Ironically, Gay Head individuals had readily contracted for goods and services on credit prior to 1862, but district status virtually destroyed this freedom. Since it made the community liable for the individual debts of its residents as well as those contracted by the overseers, and since the community had no treasury, district status had the effect of drying up credit at Gay Head (Levitas 1980:213-214).

State intrusion in Gay Head affairs followed rapidly. In 1863 the General Court, following Earle's recommendation that state law be imposed on the existing land system at Gay Head, ordered that the boundary lines between

individual land users be ascertained (Mass. Acts 1863). Charles Marston was appointed to complete this work, and he began meeting with the Indian descendants at Gay Head soon after his appointment (Marston 1866). In response to complaints that dogs from Gay Head were ravaging sheep on the Vineyard, the General Court in 1864 extended the state laws concerning the protection of domestic animals to Gay Head, and for the purposes of enforcing this law deemed the District of Gay Head to be "a part of the town of Chilmark" (Mass. Acts 1864).

Charles Marston became seriously ill before completing his survey. However, he managed to establish the boundaries of many of the existing farms and homesteads at Gay Head. In 1866 the General Court confirmed the land titles he had established up to that time and ordered that these titles be deposited in the registry of deeds for Dukes County (Mass. Acts 1866). By this same statute, Richard L. Pease was appointed to continue Marston's work.

Subsequent to these enactments, the state government moved quickly to eliminate the peculiar legal status of its non-citizen Indians. Between January of 1867 and February of 1868, the House of Representatives ordered three special committees to study the feasibility "of removing the civil and political disabilities under which they are placed, and of merging them in the general community as citizens" (Mass. House 1867a; 1867b; 1868). Yet the legislature declined to take action until after Governor William Clafin, in his annual message to the General Court on January 9, 1869, strongly denounced this "political anomaly" and declared that "It should exist no longer." The governor further opined that:

> These persons are not Indians in any sense of the word. It is doubtful there is a full-blooded Indian in the State . . . A majority have more or less the marked characteristics of the aboriginal race, but there are many without a drop of Indian blood in their veins. The marraige of a foreigner with a member of a tribe transforms the foreigner into an Indian. The result of this singular system has been a heterogeneous population, in which the characteristics of the white and negro races have already nearly obliterated all traces of the Indian (Clafin 1869).

Commenting on the governor's comments some 35 years later, a Gay Head Indian spouse named Mary A. Cleggett Vanderhoop wrote: "In the offspring of the intermarriages the strongest blood may show externally and the predominant features are those of either the white or the negro, but the Inner self, the ego, the soul, the mind, the living principle, is wholly and always and forever -Indian" (Vanderhoop 1904).

Three weeks after the governor's address, on January 30, 1869, the selectmen, treasurer, and clerk at Gay Head petitioned the General Court on behalf of "the citizens of the district," expressing the view that they did "not at present feel willing to assume the burdens of citizenship." This petition requested that they be permitted to maintain their status as an Indian district because: (1) without special state aid they would not be able to support their schools; (2) the Society for the Propagation of the Gospel would no longer provide for the support of their preacher because they would soon lose their "identity as Indians;" (3) they were too poor to survey, clear, and fence their lands on their own; and (4) they did not want to be incorporated into the town of Chilmark (Thomas Jeffers, et al. 1869). A few

weeks later, on March 3, the selectmen and 26 other district residents petitioned the legislature to protect their land rights in the cliff area (Cooper, et al. 1869).

In May of 1869, seven Gay Head residents petitioned the General Court on their own behalf, expressing their desire to become citizens and have all of the common lands permanently divided into individual plots (Rodman, et al. 1869). The seven petitioners included three men (two Indian and one non-Indian) who had married into the group, their Gay Head spouses, and a man of Gay Head ancestry who had been born and reared elsewhere. Thereafter a special committee completed yet another study of the legal status of the Indians and concluded, even without visiting Gay Head, that the state's Indian descendants were almost totally devoid of political or civil rights. As a solution to this problem, the committee proposed legislation which would grant full citizenship to all "Indians and people of colour heretofore known as Indians," including the right to hold fee simple title to allocated lands (Mass. House 1869). It also recommended that all of the Indian common lands be divided, except at Gay Head and Mashpee. Finally, it proposed special legislation to charter Mashpee as a town, but requested deferral of the land question at Gay Head until it had an opportunity to visit that district (Ibid.).

On June 23, 1869, the General Court enacted the recommended legislation (Mass. Acts 1869a), and in a separate act appointed a joint legislative committee to report on conditions at Gay Head (Mass. Acts 1869b). Thus the Indians at Gay Head were made citizens of the Commonwealth despite the objections of their elected officials.

The appointed legislative committee held meetings at Gay Head to discuss the objections expressed in the January 30 petition. The issue of enfranchisement having already been decided, the committee pledged continued Commonwealth support for the Gay Head school and expressed the hope that the Society for the Propagation of the Gospel would also continue to support the local ministry despite the fact that the Gay Headers were "no longer technically Indians." After taking further testimony, the committee concluded that the people of Chilmark were strongly "opposed to the annexation of Gay Head to them," and that the Gay Head citizens were "(with one exception) unanimous for a separate township" (Mass. Senate 1870). The accuracy of this statement has been questioned by Levitas in light of evidence that indicates continuing dissension in the Gay Head community over this issue (Levitas 1980:215-221). Nevertheless, the committee, in its report to the Senate on January 30, 1870, recommended that Gay Head be incorporated as a town (Mass. Senate 1870).

TOWN STATUS, 1870-1920

Following this recommendation, the General Court enacted legislation on April 30, 1870, which established Gay Head as a town (Mass. Acts 1870). Thus, the final "political anomaly" in the Commonwealth was eliminated and the Gay Head Indians were no longer officially recognized as a distinct tribal entity by the State. Gay Head was now incorporated as a township in the same representative district as Chilmark "with all the powers, privileges, rights and immunities, and subject to all the duties and requests" of all the other towns in the state. A mechanism was established for calling the first meeting to elect town officials, and for dividing the common lands and establishing individual boundaries. The law further authorized the construction of a road

from the Chilmark line to the lighthouse as well as provided continued support for the Gay Head school for a period of five years (Ibid.).

In accordance with this statute, the citizens of Gay Head met in August of 1870 to organize a town government and elect its initial officers. Over the course of the next century, this local government operated primarily through an extended kinship network of Gay Head Indian descendants. All of the selectmen and the majority of the other elected town officials were Gay Head Indians. Certain lineages were represented consistently and family ties were usually indicative of political alliances (Grabowski 1982:74).

Despite the enfranchisement of Gay Head Indians, the Commonwealth continued to recognize a special status for its Indian citizens. The state laws as codified in 1882, for example, continued to authorize payments to indigent Indians, to exclude Indians from the general restrictions placed on harvesting shellfish, and to provide for the prosecution of trespassers on Indian lands (Mass. Public Statutes 1882a; 1882b; 1882c). Although the General Court generally treated Gay Head like any other town without reference to its being a community of Indian descendants, it did acknowledge on occasion that there were Indians living there. On January 29, 1884, for example, Representative Chappelle of Boston moved to have a House committee consider a proposal for providing monetary awards to "those members of the tribe of Gay Head Indians" who had helped rescue the 30 survivors of the steamer City of Columbus, which had run aground near Gay Head during a storm on January 18 (Mass. House Journal 1884; Attaquin 1970:37-38; Mayhew 1956:127). The General Court authorized a payment of $200 each to eleven Gay Head men (Mass. Acts 1884), and their heroism was also recalled to the credit of the town in 1891 when the legislature appropriated funds to repair the Gay Head school house (Mass. Acts 1891; Vineyard Gazette 1891). When town resident Edwin D. Vanderhoop was chosen in 1888 to represent Dukes County in the General Court, he was acknowledged to be the first Indian descendant ever elected to a seat in the state legislature (Hough 1975:123; Attaquin 1970:39; Vanderhoop 1973:14).

In 1871 Richard L. Pease completed his examination of land titles at Gay Head and issued a final report to the Commonwealth which included a census of the Gay Head membership. Pease counted 227 Gay Head Indians, of which 188 were native-born and 39 were born elsewhere. Although he had tried to be as meticulous as possible, he warned that his census of 1871 was only approximate since: "It is not an easy matter to enumerate all who ought to be numbered as Gay Head Indians, and none but those; for the rule has been, 'once a proprietor, always a proprietor.' Those who have left, either permanently or temporarily, claim still to belong to the tribe, together with the families of such as have them. Not a few lead a roving, unsettled life, seafaring men, often absent for years at a time, frequently without their friends knowing where they are" (Pease 1871:27). As if to prove his point, the Federal census of 1870 found only 160 residents at Gay Head, of whom 151 were listed as Blacks rather than Indians (Bureau of the Census 1870). Our genealogical research indicates that at least 15 Gay Head residents were missed by this Federal census.

After Gay Head was incorporated as a town, Richard Pease and his cousin Joseph Pease allotted portions of the common lands to community members. Plots were divided among individuals with each receiving scattered tracts with access to agricultural land, woodlots, or the beach (the rationale for individual allotments is now difficult to discern). However, the granting of fee simple

titles to individuals did not halt the communal exploitation of land and resources. Community members, including those without land of their own, were still given open access throughout the town to plant, hunt, fish, pastur[redacted] livestock, and collect fruit. This communal ethic, which was viewed as bei[redacted] characteristically Indian by the Gay Headers, was even extended to th[redacted] homesteads themselves, which were considered to be the joint property of all family members (Grabowski 1982:49,66). Some common land, including the cranberry bog, cliff, and Herring Creek areas, was left unallotted. Because Gay Head Indians made exclusive communal use of these areas, they came to assume that these lands belonged to them as Indians, when in fact they were the property of the township.

For the first time since 1711 the individual proprietors at Gay Head could now sell or mortgage their property at will. Some did choose to sell their homesteads to non-resident Whites and others lost their mortgaged land through foreclosure when debts to grocers and other merchants could not be paid (Levitas 1980:335,354). In 1879 a group of Chilmark fishermen began moving their summer marine operations to an area on the north shore area of Gay Head which came to be called Lobsterville (Ibid.: 262,266). As a result of these developments, there were 18 non-resident property owners at Gay Head by 1895, of whom 10 were from off island (Ibid.: 352). However, this gradual shift in land ownership, which continued into the 20th century, did not bring about a commensurate increase in the non-Indian population. In 1900, 32 of the 34 registered voters and 162 of the 173 residents at Gay Head were listed as being Indian (Town of Gay Head 1900; Bureau of the Census 1900).

Gay Head allottees tended not to will their property, so when they died their land interests were merely divided on paper among numerous heirs. The comple[redacted] system of scattered land ownership thus took on some of the heirsh[redacted] characteristics common to Federal Indian trust allotments. However, in thi[redacted] case the problems were compounded by the fact that there were no restrictions against taxation or alienation and good written records of conveyances were not kept. Thus town officials always had difficulty collecting taxes and some heirs managed to use and even sell inherited land without the consent of other legal heirs (Levitas 1980:355-356; Grabowski 1982:66).

Farming declined at Gay Head after the land was allotted. As an alternative livelihood to whaling, which ceased to be important after the Civil War, Gay Head men gradually turned to commercial fishing (Levitas 1980:260). Others found employment at a local clay pit (Ibid.:274). In 1895 the U.S. Life-Saving Service (now known as the U.S. Coast Guard) established a station adjacent to the Gay Head lighthouse, and several local men enlisted as surfmen (U.S. Life-Saving Service 1899).

By the 1870's excursion steamboats were bringing mainland tourists in large numbers to Gay Head to see the spectacular multi-colored cliffs and the lighthouse. Some Indian descendants were able to profit from this boom, which lasted until 1890, by providing food, lodging, and transportation to the tourists (Mayhew 1956:127-128; Levitas 1980:327-328). However, the tour and steamboat operators chose to ignore the fact that Gay Head was an Indian town in their advertising (Levitas 1980:321). Likewise, out of a sampling of five travel guides to Martha's Vineyard published between 1874 and 1882, only one acknowledged that there were "remnants of the tribes living on the soil" (Shaler 1874:738-739). However, the author of this guide also observed tha[redacted] "the Indian blood has been almost washed away by the mixture of the negro an[redacted] white races" (Ibid.).

Some of the demographic trends apparent at Gay Head in the late 1800's continued into the present century. There was a gradual decrease in the native population as the number of Indians who left the community increased. This resident population declined by 22 percent (from 162 to 126) between 1900 and 1920 (GHWT 1985:3), and by another 22 percent (from 126 to 98) between 1920 and 1940 (Ibid.). At the same time, non-Indians continued to acquire more land, gaining title to one-third of the Gay Head land base by 1915 (Town of Gay Head 1915). In addition, more and more non-Indian property owners began to take up residence within the community. In 1914 they formed the Gay Head Improvement Association to protect their interests (Levitas 1980:497). By 1920 they comprised 13 percent of the total population (GHWT 1985:3), and this proportion increased to 20 percent by 1930 (Ibid. 1930) and to 23 percent by 1940 (Ibid.).

Anthropologist Gloria Levitas, who conducted the most extensive ethnographic investigation of Gay Head, has concluded that with the imposition of town status upon their community, the Gay Head Indians lost their political autonomy as a tribal group (Levitas 1980:595-596). However, the acknowledgment petition maintains that after incorporation the imposed town government structure was adapted by the Indians as their governing body, so that in effect the town and the Indian government became one and the same. To demonstrate the political monopoly held by the group, the petition points out that every selectman between 1870 and 1982, with one exception, was a group member, and that "until recently, . . . [Indians] held every other elected office" (GHWT 1983:I:(c)8). While it is true that there was only one non-Indian selectman, non-Indians have consistently held positions in the local government since incorporation. A cross-referencing of lists of town officials with the group's ancestry charts indicates that between 1870 and 1972, the year in which the Wampanoag Tribal Council of Gay Head was formed, at least 34 of the individuals elected or appointed to town offices were not of Gay Head Indian descent. Lists of town officers for the period 1870 to 1899 are no longer extant, but state records indicate that the first man to hold the important position of town clerk was William D. Vanderhoop, a non-Indian, and that for the period 1873 to 1888, this post was held by Isaac D. Rose, a non-member mulatto who had previously served as an elected overseer and as the district clerk (Mass. State Vital Records 1841-1890). Between 1899 and 1920, five (5) other non-Indians were town officials, including Charles H. Ryan (cranberry agent, 1899-1901), Charles S. Hatch (auditor, 1910), William M. Marden (town clerk, 1921-1922), Merriam C. Hayson (library trustee, 1921-1922), and Harry W. Webster (constable, 1926) (Town of Gay Head 1899-1980). With the exception of Hatch, however, all of these individuals were married to Gay Head women.

The precise nature of the town government between 1870 and 1955 is not known because the records of town proceedings no longer exist. While there is convincing evidence that group kinship ties played a crucial role in this local government, the town structure would have made for a peculiar kind of tribal governing body. Unlike any other tribal government, the town government was mandated by state law to accept legal responsibility for all residents of the township. This came to include an increasing number of non-Indians. The proportion of non-Indian residents grew from 13 percent in 1920 to 47 percent by 1970 (GHWT 1985: 3). At the same time, as a municipal polity the local government had no legal authority outside of the town boundaries. Therefore, it could not legally maintain jurisdiction over the significant number of Gay Head Indian descendants who left the town to reside elsewhere, either permanantly or temporarily (the resident Indian population decreased by approximately 61 percent between 1900 and 1970) (Ibid.). However, those

non-resident Indians who still held property or paid taxes in the town may have been affected by local government actions. No evidence was found to indicate that the town officials exerted any informal political influence or control over the non-resident Gay Head Indian descendants or that the non-resident participated in the political process within the town.

State law also restricted the political participation of non-residents. Those Indian descendants who did not maintain residence at Gay Head at least part of the year were not entitled to vote there, either in the town meetings or the general elections. The town's voter registration records for the period 1884 to 1916 indicate that in order to register in October of any given year, an individual had then to be resident in Gay Head and also to have resided there on May 1 of that same year (Ibid.: Exhibits).

During the first fifty years of the town's existence (1870-1920) the selectmen only petitioned the General Court on two occasions: in 1891 to request funds for school repairs (Mass. House 1891) and in 1896 to reestablish the Gay Head-Chilmark boundary (Thomas Jeffers et al. 1896). Thus there is virtually no evidence to indicate how the local government functioned for either the town or the group during this period. Knowledge regarding the status of the town government after 1920 can only be gleaned from indirect sources, since the official town records burned in a fire in the 1950s. Beginning in 1921, state records indicate that legislation was occasionally introduced in the General Court on behalf of the town, and from 1955 onward town meetings were routinely reported in the Edgartown newspaper, the Vineyard Gazette. From the perspective of these sources, the substance and form of the local government appears indistinguishable from any other small New England town, and it is difficult to characterize any of the actions of this governing body as being distinctively Indian or tribal. It did not, for example, take action to assert an Indian identity, define group membership, or perform traditional ceremonial functions. Its focus was entirely on mundane civil matters.

In 1916 the community opposed a bill generated in the General Court by non-Indian property owners to create a 100 acre state park at the Gay Head cliffs. Gay Head Indians called in the noted Sioux spokesman Dr. Charles Eastman to argue in their support at a local hearing and, as a result, were successful in getting the legislature to reject the proposal (Levitas 1980:416). Although this development was indicative of the community's Indian identity and its possible links to off-island Indians, there is no evidence that the town government was in any way involved.

Levitas and Grabowski have demonstrated how proud the Gay Head community was of its self-sufficiency and how it therefore worked to keep itself isolated from outside attention. This insularity was upset in 1918 when Lorenzo D. Jeffers, the most controversial political figure at Gay Head during this century, and the son of a former town selectman, pointed out certain irregularities in the town government to state authorities and asked that they take steps to provide better training for local officials. Although it was apparently Jeffers intent to establish himself as a mediator between Gay Head and the outside world and thus perhaps gain more state aid for Indians, Levitas reports that this move scandalized the town, not only because of the negative attention it drew, but also because the investigation ultimately implicated Jeffers' own father (Levitas 1980:405-406). Nevertheless, Jeffers was elected as a town selectman in 1920 and served in this capacity until 1926 (Town of Gay Head 1899-1980).

INDIAN IDENTITY, 1900-1930

A sampling of local histories and travel guides published between 1908 and 1932 indicates that Gay Head was consistently identified as an Indian community (Hine 1908:202; Vineyard Gazette 1915; Eaton 1923; Vineyard Associates Publicity Bureau n.d.; Norton 1923; Goell 1925:10; Martha's Vineyard Chamber of Commerce 1930; Anonymous 1932). In a travel brochure published by the New England Steamship Company in 1923, William Pritchard Eaton wrote:

> the Gay Head peninsula, by the way, is a separate township, almost entirely populated and admininstered by the last of the Indians who originally dwelt on the Island. They seem to have kept their native stock more pure than the Narragansetts of South County, Rhode Island, and it is a strange sensation to come out on the brow of the cliffs and see sitting there a group of children, silently waiting for you to buy one of the small jars they have fashioned out of the red and yellow clays--vessels that preserve intact the shapes designed by their remote ancestors (Eaton 1923).

Between 1905 and 1918, the United States Government also recognized at least six Gay Head boys as being eligible to attend the Carlisle Indian Industrial School at Carlisle, Pennsylvania (Carlisle Indian Industrial School 1905-1918). Of these known students, two eventually became town selectmen (Lorenzo D. Jeffers, 1920-1926, and Charles W. Ryan, 1935-1949), one the town clerk (Lyman B. Madison, 1923-1942), and another the Medicine Man for the Howwaswee Council (Napoleon Madision) (Town of Gay Head 1899-1980). The other student was Chester Cook.

The ethnologist Gladys Tantaquidgeon conducted field studies at Gay Head during the summers of 1928 and 1929. Although she found little evidence of the survival of aboriginal culture and was only able to collect a meager vocabularly of fewer than 100 Algonquian words, she maintained that the people she observed "may still be regarded as Indians" (Tantaquidgeon 1930:1-26). Anthropologist Gloria Levitas has concluded that Gay Head's Indian identity was sustained, despite the disappearance of native language and culture, by geographic isolation, by racial prejudice which prevented social and economic integration with the rest of the Vineyard, and by the fact that such an identity was good for the town's burgeoning tourist trade (Levitas 1980:448,470). She maintained further that although Tantaquidgeon had observed that some Gay Head Indians retained knowledge of Indian crafts, healing techniques, and superstitions as late as 1929, communal land use became the only trait which distinguished Gay Headers as being Indian (Ibid.: 381,470).

Most Gay Head Indians preferred to identify themselves as Wampanoag descendants and were publically referred to as Indians by most other island residents, although many tended to perceive them as being Black rather than Indian (Ibid. 32,331). Because the Gay Head Indians were regarded as subordinate to Whites in the social hierarchy of Martha's Vineyard, they became the subject of racial prejudice and segregation (Ibid. 61). For example, there was little social interaction and no intermarriage between Gay Head families and those in the neighboring town of Chilmark, and there was only one recorded marriage between a Gay Header and a White island native (Ibid.: 278,331,333). Thus, in the early 20th century, most social contacts

were restricted to other Indian descendants, and later with Blacks from the down-island towns of Oak Bluffs and Vineyard Haven, including with those Portugese known as "Bravas." Still later, the Gay Headers intermarried with Whites who had moved to the island. The Indian descendants tried very hard to distinguish themselves from Blacks in the eyes of island Whites, but did not always succeed in doing so (Ibid.:62). Those Indian descendants who intermarried with Blacks or had Black ancestry were still generally regarded as being Indians if they remained on the Vineyard. However, many Gay Headers who moved off-island found that their Indian identity was questioned by Whites, Blacks, and even other Indians (Ibid.:32).

Levitas was struck by the lack of community celebrations at Gay Head and speculated that the group's extensive off-island social ties may have eroded the internal cohesion of the community (Ibid.:384). The only enduring community celebration was the annual day-long cranberry harvest in October. The acknowledgment petition maintains that Cranberry Day "was, and continues to be an exclusively Gay Head Indian event" (GHWT 1983:I:67). Yet, it is curious that between 1899 and 1901 a non-Indian was chosen to be the Cranberry Agent, the town official whose duty it was to supervise the harvest (Town of Gay Head 1899-1980). As described below, one observer noted that by 1947 the festivities surrounding this event had much declined (Loveridge 1947).

The community Baptist church provided for a great deal of social cohesion at Gay Head (Tantaquidgeon 1934), but was not exclusively Indian. Non-Indians from Lobsterville attended services and contributed to the upkeep of the building, and exchange services were sometimes held with the White congregants of the Baptist church in Vineyard Haven (Vanderhoop 1973:31-32). During the 1920's and 1930's, summer residents from down-island also brought their "colored maids" to the Gay Head church (Grabowski 1982:2-3).

Twenty-three men from Gay Head served in the armed forces during World War I and one lost his life. In proportion to its size, Gay Head sent a larger percentage of servicemen to the war than any other town in New England. To commemorate its patriotism, Governor Samuel McCall dedicated a plaque in front of the town hall on April 6, 1918 (Attaquin 1970:40). However, neither the plaque nor the ceremony reflected the fact that all but one of the Gay Head men were of Indian descent.

During the 1920's Gay Head town officials petitioned the General Court on three occasions, and in each case favorable legislation was enacted. Laws passed in response to petitions in 1921 and 1923 authorized the town selectmen to regulate certain kinds of trawl fishing in town waters (Mass. House 1921; 1923; Mass. Acts 1921; 1923). In 1928 the legislature permitted the town to borrow money for the construction of a town hall (Mass. House 1928; Mass. Acts 1928).

During the first three decades of this century, several modern pan-Indian movements were organized by a number of acculturated Indian descendants who felt the need to establish a new Indian identity beyond their local tribe or group yet fully within the social order of the dominant culture (Hertzberg 1971:viii,299-301). In New England, as elsewhere, this phenomenon led those with Indian ancestry to renew their interest and activity in tribal culture, to create new pan-Indian organizations, and to seek ties to similarly motivated Indian groups through mutual activities such as powwows.

In the late 1920's, Lorenzo Jeffers, Harrison Vanderhoop, Napolean Madison and some others of the so-called "cosmopolitan" Gay Headers (those who had spent considerable time off-island) became active in the Wampanoag Nation, a new pan-Indian organization formed by the Indians at Mashpee. This group sought to revive Wampanoag culture and to replace the territorial basis of the Indian communities at Mashpee and Gay Head with a tribal organization founded on common ancestry. It recognized Jeffers and Vanderhoop to be the chiefs of its local branch at Gay Head, which was called the Aquineah Council (Levitas 1980:411-412; New Bedford Standard Times 1934; 1935). According to one source, Jeffers successfully led a movement against the town government's reigning political faction in 1931 which led to its ouster (Vineyard Gazette 1931).

THE 1930's

In the early 1930's the emergence of a new ethnic consciousness became apparent at Gay Head when some community members began sponsoring an annual powwow at the cliffs (Ibid. 1932). In 1933 a number of off-island Indian descendants were invited to a special powwow ceremony honoring Gay Head's superlative participation in World War I (Ibid. 1933). According to Levitas, this event marked the first time that the Gay Head Indians formally recognized their relationship to other Indian communities (Levitas 1980:380). In 1933 the community was also invited to send representatives to a ceremony dedicating the Bourne Bridge on Cape Cod. Although there is conflicting evidence on this subject, this event may have stimulated the formation of a local ceremonial organization at Gay Head, which may have either been the Howwaswee or Aquiniah Council (See GHWT 1983:I:12). Yet the community as a whole and its town government ultimately rejected any formal pan-Indian alliances and spurned attempts to redefine the Gay Head Indian community in broader terms.

In 1932 the community denied the efforts of certain non-resident Indian descendants who attempted, with Lorenzo Jeffers' support, to gain voting rights at Gay Head (Levitas 1980:411-412). In 1934 it voted overwhelmingly against Harrison Vanderhoop in his bid to become a town selectman and refused even to reelect this pan-Indian supporter, who had worn Indian regalia to the town meeting, to the minor post of fish warden (Vineyard Gazette 1934). This rejection of Vanderhoop may have been related to his alliance with Jeffers in endorsing the idea of island merchants to create a national park at the Gay Head cliffs. Because of his stand on this issue, Vanderhoop was deposed as Chief of the Aquineah Council. His position was then assumed by Leroy W. Perry, the Gay Head preacher who was also the Tribal Chief of the Mashpee Indians and the Supreme Sachem of the Wampanoag Nation (Levitas 1980:413; New Bedford Standard Times 1935). Perry and the rest of the Gay Head community also declined to support Jeffers' idea to establish an Indian Day in Massachusetts (Levitas ibid.)

In a report submitted to Commissioner of Indian Affairs John Collier in December of 1934, the ethnologist Gladys Tantaquidgeon identified the Aquineah Council and not the town officers as representing the "tribal government" at Gay Head. In this same report, Tantaquidgeon estimated that there were 150 Gay Head Indians present in the community and 52 others who were considered "absentee" (Tantaquidgeon 1934).

A faction fight for leadership of the Wampanoag Nation in 1935 led Jeffers and Vanderhoop to organize a competing organization at Gay Head known as the Howwaswee Council. The formation of this council, which took its name from the old Gay Head family, permitted Gay Headers to assert their identity with cultural aspects they considered Indian and at the same time maintain their traditional independence. Harrison L. Vanderhoop, the deposed Chief of the Aquineah Council, was elected to lead this organization and became known as "Chief Nohono." Napoleon Madison, a supporter of Perry who had also served as the Medicine Man for the Wampanoag Nation, became the Medicine Man for this new council after Harold Manning resigned during his first year. Lorenzo Jeffers served as the Sagamore (Grabowski 1982:17; New Bedford Standard Times 1935).

The role of the Howwaswee Council, which continued to exist for 20 years, was almost purely ceremonial. It worked to assert a Wampanoag identity and establish ethnic pride in the community through activities such as local and off-island powwows, pageants, and other public events. While this council performed some of the ritualistic functions associated with traditional tribal governments, it operated outside of the political sphere of the town government. Of its initial 21 officers, however, 5 also served in minor town offices between 1935 and 1940 (Town of Gay Head 1899-1980). It is not known how much support this organization received from the Gay Head community as a whole: its early membership was comprised largely of two family lines, the Vanderhoops and the Jeffers. Two of its first officers were non-Gay Headers who may have also been non-Indians: Rachel Jeffers and a Mrs. Wessler (New Bedford Standard Times 1935).

Rachel Jeffers also served as town treasurer between 1938 and 1939, and Ruth Jeffers, another non-group member, served on the school committee (1931-1933) and as a library trustee (1930-1933) (Town of Gay Head 1899-1980). The town selectmen did not petition the General Court during the 1930's, but there were two events which focused outside attention on the town government during this decade. In 1936 Lorenzo Jeffers attempted to introduce partisan politics into the nonpartisan but traditionally Republican town council by offering a slate of Democratic candidates. After he was denied, he filed a complaint against Gay Head election officials in District Court, charging them with a violation of election laws. This move was apparently effective, for in 1937 a Democratic town committee was invited to present candidates at the annual town meeting (Vineyard Gazette 1936; 1937).

As has been previously noted, town officials refused to take action against Gay Head Indians whose property taxes were in arrears. In an effort to remedy this situation, the State attempted in 1938 to seize 45 parcels of Gay Head land as payment for delinquent taxes. By 1940, however, most of these seizures were disclaimed and only two parcels passed into town ownership through foreclosure (Levitas 1980:419).

The decade of the 1930's saw more Gay Head land pass into non-Indian ownership as the town became increasingly attractive as an isolated vacation community. Socialist writer Max Eastman, actress Margaret Webster, and playwright Lillian Hellman were among those who purchased land there. Communal activities among the Indian descendants declined and farming and stock raising disappeared almost completely by the end of the decade, while fishing and tourism continued to be important economic activities (Levitas 1980:358-359, 365-366). Between 1935 and 1940 the total resident population dropped by

approximately 20 percent, from 158 to 127 (Vineyard Gazette 1941a). Notwithstanding these developments, the Federal Writers Project guidebook to Massachusetts, published in 1937, stated that Gay Head was one of two places in the state where "the Indians have been able to preserve a semblance of their ethnic identity." It also observed that the Gay Head Indians "have kept their stock more nearly pure here than elsewhere" (Federal Writers Project 1937:26-27).

THE 1940's

The coming of World War II hastened further the outmigration of Gay Headers, as many of the Indian descendants left for the armed services, college, or employment in defense plants or government relief projects. Outmarriage also continued to be the norm. By 1943 the Indian population had declined to just 77, down 21 percent from 1940 and 40 percent from 1930 (Levitas 1980:450, 493). This resident population would remain fairly stable over the next four decades, experiencing a net gain of only one individual between 1943 and 1985. Most of those who found success elsewhere never returned, although a number of college-educated women, most notably the daughters of Cummings A. Vanderhoop, were drawn back by strong family ties (Ibid.: 456-457). Three of these Vanderhoop daughters worked for the U.S. Indian Service in the 1940s; two with the Kiowa Tribe in Oklahoma and one at the Tacoma Indian Hospital in the state of Washington (Vineyard Gazette 1948).

Those Indian descendants who remained at Gay Head became active in new community projects. In 1941 a pageant based on the legends collected about the Wampanoag culture hero Moshup was staged at the cliffs, with proceeds going to a scholarship fund for Gay Head children (Ibid. 1941b). Although this pageant, which continued to be produced sporatically for 30 years, had a historic Wampanoag theme, it did not involve any traditional ceremonies, and non-Indians were among its regular participants (Levitas 1980:367-368). It has also been observed by one scholar that the modern legend of Moshup is quite different from that which was originally published in 1792 (Scaglion 1974). A group of women also organized the Aquinnah Club in the 1940's to promote community interests and provide new social opportunities. This organization, which spearheaded the effort to bring electrification to Gay Head, was led by Ruth Jeffers, who was not a Gay Head Indian descendant (GHWT 1983:I:(b)14).

No documentation could be found regarding the activities of the town government during the 1940's and the selectmen did not petition the General Court during this decade. The only record available are lists of town officers, from which it can be deduced that at least two were not Gay Head Indian descendants: A.J. Saunders (town treasurer 1944-1945, 1947-1949, and assessor 1946-1951) and Richard Kestenbaum (fire warden 1946-1947, and constable 1947) (Town of Gay Head 1899-1980). Kestenbaum was married to a Gay Head Indian woman.

In 1947 Dr. Henry Collins of the Smithsonian Institution claimed that the Indians at Gay Head represented the purest Indian strain in the East. "Among these Gay Head people," he stated, "are individuals with features more characteristic of the general American Indian type than the traditional picture of Algonquins" (Loveridge 1947). A Providence, Rhode Island reporter, commenting on Collins observations, also wrote that the Indians at Gay Head

"conduct their own affairs" and make "a not insignificant profit" from non-Indians by selling fish, pottery, and moccasins and providing other goods and services. However, he concluded that "the tribal organization is tending to disintegrate" and cited as evidence the decline of the Cranberry Da festivities and the fact that a powwow had not been held in a dozen years (Ibid.).

THE 1950's

During the decade of the 1950's, both the Indian and non-Indian population at Gay Head increased: the former by 8 percent and the latter by 35 percent. By 1960, non-Indians constituted 25 percent of the total population (GHWT 1985: 3).

The Howwaswee Council was reorganized at some point in the early 1950's and renamed the Pawkunnawakutt Council, after an early appellation for the Gay Head Indians. Donald Malonson was elected Chief of this new organization and Napolean Madison continued as Medicine Man. In the meantime, Lorenzo Jeffers, who reemerged in the 1950's as a controversial figure in Gay Head political life, claimed leadership of the Mashpee-based Wampanoag Nation following the death of Leroy Perry (GHWT 1983:I:(c)13, (b)15). In 1951 he was also elected to a town office for the first time since 1926, and he served as one of the town assessors, the highest paid position in town government, until 1964. Thereafter he also served as a town constable (1965-1967) (Town of Gay Head 1899-1980).

Due largely to the efforts of the Aquinnah Club, Gay Head received electricity for the first time in 1951 when power was extended to its public buildings and a few private homes (Vineyard Gazette 1951a). A Gay Head Civic Association, founded in 1950, also worked to bring running water to the town hall and school, and the proceeds of the 1951 and 1952 Moshup pageants went to this project (Ibid. 1951b; 1952).

In 1952 the Federal Government decided to relocate the Coast Guard station and lighthouse at Gay Head because of a serious erosion problem at the cliffs. The arrival of electricity rendered the famous Fresnal lens obsolete and it was thus offered to a museum. Because the light had been a major tourist attraction, Lorenzo Jeffers organized an alliance of down-island businessmen and "cosmopolitan" Indians like himself to fight to keep it at Gay Head. After this effort failed, he attempted to establish a museum at the cliffs to replace the Fresnal lens as a tourist attraction (Levitas 1980:481-484). Drawing support from the same cosmopolitan Indian descendants who had worked to bring electricity to the town, Jeffers formed a museum corporation in 1958 which opened a small exhibit area in the schoolhouse. This museum was called the Gay Head Museum of Whaling and Natural History, since its initial objects pertained to the town's maritime and geological history. Only later, after it was moved to the town hall and then to a building on the cliffs, were Indian artifacts and pottery added to its collections (Attaquin 1970:41-42; Mayhew 1956:126).

In 1955 Jeffers revived the old Gay Head Improvement Association to promote civic activities and to foster an Indian identity in the community. This organization sponsored the Moshup pageant in 1955 and donated the proceeds

toward the improvement of the town harbor. However, this association proved to be short lived (Vineyard Gazette 1956b).

Four bills were introduced in the General Court on behalf of the town of Gay Head during the 1950's. Three of these bills were generated by petitions from the town selectmen in 1953 and 1955 and dealt with fishing restrictions in town waters, and with the assessments made for the county sanatorium (Mass. House 1953a; 1953b; 1955). The fourth was introduced in 1959 at the behest of Lorenzo Jeffers and his supporters. It called for the creation of a special commission to investigate the feasibility of improving general conditions at Gay Head (Ibid. 1959). Although Jeffers stated that he merely wanted a general survey of the town's resources so that new opportunities might be considered (Vineyard Gazette 1959c), a Boston newspaper interpreted this action as seeking rights for the Gay Head Indians and the return of Gay Head to reservation status (Ibid. 1959b). Leery as ever of outside intervention, the town selectmen were disgruntled over the Jeffers bill and succeeded in getting the General Court to ignore it. As selectman Leonard Vanderhoop put it: "I don't think we want the state to step in here and tell us how to run our business" (Ibid.).

The lists of town officials indicate that at least five non-Indians served in office during the 1950's. These include the previously noted A.J. Saunders (assessor 1950-1951) and Richard Kestenbaum (auditor 1950-1958), as well as Jacquelyne Manning (tax collector 1952-1955), Phyllis Perry (school committee chairman 1953-1959) and Theodore Howell (assessor 1956-1959) (Town of Gay Head 1899-1980). All but Saunders and Howell were married to Gay Head Indian descendants.

From 1955 to the present, the proceedings of most of the annual and special Gay Head town meetings are known to us from articles that appeared in the Vineyard Gazette. The meetings held between 1955 and 1959 generally lasted for six hours and were marked by a great deal of decorum and a minimum of debate. In these meetings the town citizens addressed such issues as tax assessments, building codes and zoning, road construction and rights of way, tourism, improvement of the town harbor, and pest control (Vineyard Gazette 1955a; 1956a; 1956b; 1957; 1958b; 1959d; 1959e; 1959f). No one who did not already know that Indian descendants comprised three-fourths of the population of the town and also dominated its government would be able to glean even a hint of these facts from these proceedings.

However, the newspaper accounts do shed further light on the nature of Lorenzo Jeffers' political involvement in the community. While it is clear that the majority of the local Indian descendants disapproved of his efforts to link Gay Head to the extended world, the descriptions of the town meetings in the 1950's indicate that he did have community support for a number of his proposals which dealt with internal matters. His ideas to improve the town harbor and establish a museum, for example, received broad-based community endorsement (Ibid. 1955b; 1956a; 1959e). Like many other Gay Headers, Jeffers spent at least part of each year off-island. During the summer of 1959, for example, he was employed at Woods Hole, Massachusetts (Vandal 1959). While becoming more vocal in town affairs during the 1950's, he also managed to sustain his leadership in off-island Indian activities. In 1958 he served as Chief Medicine Man at the annual powwow of southern New England Indians at Mashpee (Vineyard Gazette 1958a), and in 1959 he was elected President of the Organization of Wampanoag Descendants, a new group that was also formed at

Mashpee. Mrs. Gladys Widdiss, the current President of the Wampanoag Tribal Council at Gay Head, was elected Secretary of this organization (Ibid. 1959a).

THE 1960's

Between 1960 and 1970, the resident non-Indian population at Gay Head more than doubled (from 26 to 55) as more and more off-island people decided to build retirement homes there (GHWT 1985: 3; 1970; Levitas 1980:507-508). In contrast, the Indian population declined by 18 percent (from 77 to 63). During the early 1960's the non-Indian summer resident population began to surpass that of the resident Indian descendants. By 1970, non-Indians constituted 46 percent of the total year-round population. These newcomers tended to be affluent and politically active urban professionals. By the end of the decade of the 1960s, they posed a serious threat to the Indian descendants for control of the town government (Ibid.).

Despite these demographic changes at Gay Head, there were only three non-Indians who served in town offices during the 1960's: Phyllis Perry (school committee 1960-1961, 1964-1967), Theodore Howell (assessor 1960-1962), and John Gonsalves, Jr. (constable 1962-1965) (Town Of Gay Head 1899-1980). Yet evidence indicates that as the decade progressed Indian office holders were compelled to address an increasing number of issues which had been raised by their non-Indian constituents. In 1961, for example, the old problem of tax delinquencies emerged once again. Because the non-Indian residents generally sought to improve and expand town services, they were baffled by the traditonal reluctance of town officials to collect property taxes from certain Indian descendants. Accordingly, Theodore Howell, one of the town assessors and a non-Indian, took the unusual step of publishing the list of delinquent taxpayers in the Vineyard Gazette (Grabowski 1982:70). Lorenzo Jeffers then petitioned the General Court, under the auspices of the Federated Eastern Indian League, of which he was President, to investigate tax procedures at Gay Head (Mass. House 1963a). The House of Representatives authorized the State Tax Commission to look into the matter, and it discovered that the uncollected taxes amounted to more than $60,000, or $10,000 more than the town's annual budget (Mass. House 1965). These problems were discussed at town meetings, but no corrective action was taken. Selectman C. Earl Vanderhoop told a state legislative committee that the town could run its own affairs without outside interference, and pointed out that although Jeffers was a town official, he was not a Gay Head taxpayer at that time, since his residence was in Quisset (Vineyard Gazette 1963b). Thirty of the town's Indian descendants then signed a petition in opposition to Jeffers' bill to investigate the tax situation. However, the state proceeded to look into these matters, and this ultimately resulted in twenty-five parcels of Gay Head land being sold to non-Indians for non-payment of taxes (New Bedford Standard Times 1967). The controversial Jeffers continued to serve as a town assessor until 1964 and was its constable between 1965 and 1967 (Town of Gay Head 1899-1980). In 1967 he was also the Supreme Sachem of the Wampanoag Nation and was living in Waquoit on Cape Cod (Jeffers 1967).

By the mid-1960's the beaches and cliffs at Gay Head were being overrun by hordes of college students and other summer visitors. In 1966 the town selectmen estimated that an average of 3650 people were visiting the cliffs on peak summer days (Vineyard Gazette 1966c). The town government was reluctant to establish restrictions because of the community's long tradition of open

access and its dependency on the tourist trade. A protracted struggle thus ensued between the resident Indian descendants and the non-Indian summer residents over the need to establish a public beach, improve tourist facilties, and allow access for tour buses. The year-round non-Indian residents also continued to voice complaints about the town's fiscal management. In 1966 the so-called "summer people," in alliance with some of the cosmopolitan Indian descendants such as Lorenzo Jeffers organized the Gay Head Community Council to address some of these issues (Ibid. 1966b).

The need to meet the increased demands of tourists and summer residents dominated the proceedings of the annual and special town meetings during the 1960's. Unlike the previous news coverage of these meetings, the Vineyard Gazette articles sometimes made specific reference to the fact that Gay Head had historically been an Indian community. Noting the reticence of the townsfolk about the upcoming annual election, a 1960 article observed that "the Indian town has preserved its traditional silence in this respect" (Ibid. 1960). In 1968 a reporter also likened the annual meeting to a traditional Indian "long talk" (Allen 1968). At the 1966 annual meeting, the townspeople discussed surveying the old Indian cemetery, and it was noted that the Indian stone artifact that had long been used by the moderator to call the meeting to order was replaced by a wooden gavel which had been used in the General Court and given to Lorenzo Jeffers by the Speaker of the House (Vineyard Gazette 1966a). In 1962 a number of Indian descendants at Gay Head petitioned the state Department of Public Works to hold a public hearing on the issue of gaining access to Squibnocket Pond, which lies between Gay Head and Chilmark. The petitioners wanted an exclusive right of way over privately held lands "inasmuch as many of them are of Indian extraction and remember the undeveloped areas as a portion of their former domain." A public hearing was held, after which the landowners provided an informal right of way to the petitioners and the State took no further action (Mass. House 1962c).

Thirty-two bills pertaining to Gay Head were introduced in the General Court during the 1960's, of which only one was petitioned for by the town selectmen. This bill requested authorization for the construction of access roads within the town and was not enacted (Ibid.:1966b).

Four of the bills requested by Jeffers dealt specifically with the Indian descendants at Gay Head. These included bills to authorize the town to convey the cliffs, cranberry bogs, and Herring Creek to these Indian people (Ibid. 1962a); to allow the Indian residents of the town to fish without a license (Ibid. 1964b); to authorize a special commission to study the advisability of returning former Indian lands to the town (Ibid. 1968b); and to authorize a similar commission to distribute all existing common lands to Indian heirs (Ibid. 1968c). In addition to the 32 bills for Gay Head, Jeffers also requested 4 bills on behalf of all of the Indians in the Commonwealth. These included legislation to permit the unrestricted use of dragnets and dredges by Indian fishermen (Ibid. 1964c); to authorize a special commission to investigate the problems and social conditions of all of the state's Indians (Ibid. 1964d); to restrict dragnetting and other trawling by power boats in the waters of Gay Head and Chilmark to Indian descendants (Ibid. 1964a); and to authorize a special investigation relative to the prevention of discrimination against the Indian people of Massachusetts (Ibid. 1968a).

The town government gave official support to only one of Jeffers' bills; a proposal to authorize the Massachusetts Department of Public Works to deepen

Herring Creek (Ibid. 1966a; Vineyard Gazette 1966a). As noted previously the town selectmen were openly critical of his request to have a special commission study the tax delinquency issue. In 1967 the town government also withdrew its support for Jeffers' museum plan (Ibid. 1967).

In 1960 the Gay Head museum had been moved to the cliff area, where it was housed in an old tourist inn. During that same year, Jeffers requested the state legislature to appropriate funds in support of his "Indian and Whaling Museum" (Mass. House 1960). In 1962, 1963, and 1967 he also succeeded in getting legislation introduced to transfer an acre of land at the cliffs for the use of the museum (Ibid.: 1962b; 1963b; 1967). The General Court took no action on these requests and in the meantime the museum was forced to close its doors (Attaquin 1970:41-42). Then in the summer of 1967 Jeffers called a special meeting to announce plans for a bigger and better facility. He also proclaimed that participation in this new project would be limited to those of Indian descent and that contributions would not be accepted from non-Indians, including Whites and "persons of color" (Levitas 1980:487). Jeffers also stunned the community by talking openly for the first time at Gay Head of "Red Power" (Ibid.).

In response to Jeffers' statements, a special town meeting was called. On the motion of Max Eastman, the town's best known non-Indian resident, the townspeople voted to request the state legislature not to support the Jeffers bill to give land to the museum. They also rebuked Jeffers and the other museum officials for not previously informing the town of their aims (Vineyard Gazette 1967). Jeffers vowed to "fight to the death," and wrote an editorial in the Vineyard Gazette explaining that the Indians had a right to the museum and that "the town has nothing to do with it" (Jeffers 1967). Left without support from either the town or the State, however, the museum was never reopened (Levitas 1980:487).

In 1966 the town of Gay Head was also compelled to close the one-room schoolhouse which had served as the community's elementary school since 1878. This came as a serious blow to the Indian descendants because the one-room schoolhouse had long been the most crucial institution in fostering an Indian identity in the town (Ibid.:488). It was here that Gay Head children learned from Indian teachers the rudiments of local history, Wampanoag legends, and arts and crafts which were considered to be traditionally Indian. The facility was closed because there were only three students and it would have cost the town $18,000 a year to continue to teach them there (Attaquin 1970:43). Perhaps more than any other development, the closing of the school served to illustrate the effect of the continuing outmigration of Gay Head's native population.

The identity of the Indian descendants at Gay Head was positively reinforced in the 1960's when a local girl was runner-up in the annual Miss Indian America pageant (Levitas 1980:550). In 1961 several Gay Head Indians also took part in the American Indian Chicago Conference which had been organized by anthropologists in order to publicize Indian issues (Ibid.: 387). However, the community gained some negative attention in 1966 after a Boston television station aired a news feature which focused on the fact that Gay Head was the poorest town in Massachusetts, according to a state study. The documentary footage and the full-page newspaper advertisements which publicized the show both identified Gay Head as an Indian town, but gave a somewhat distorted view of the nature of its poverty. The newspaper ads, for example, described the

lands will be preserved" (Vineyard Gazette 1972b; Dumanoski 1975). This organization, which was incorporated under a state charter, adopted a formal governing structure consisting of four officers and a seven-member board. It also absorbed the ceremonial positions of Chief and Medicine Man from the old Pawkannawakutt Council. Beatrice Vanderhoop Gentry was elected its first President (GHWT 1983: I(c)14-15).

The acknowledgment petition holds that the Wampanoag Tribal Council of Gay Head replaced the town government as the group's governing body. Yet, the town government did not change perceptibly in either form or actions from what it had been prior to the formation of the Tribal Council. Although non-Indians came to hold more town offices, the local government continued to be led by Indian descendants (all but one of town selectmen since 1972 have been Indian). Many of the town leaders have also been closely related to the Tribal Council leaders. Levitas maintains that the new organization was created and led by the more cosmopolitan Indian descendants and that it took at least four years for most of the so-called "local" Indian descendants, who continued to control the town government, to support the Tribal Council (Levitas 1980:550-551,557). It is also curious to note that while the town government was, with one exception, always led by men, the initial officers of the Tribal Council and all of its subsequent presidents have been women (GHWT 1983:I:(c)14-15).

The new group organization focused on four objectives: to identify its members; to seek Federal acknowledgment; to obtain funding to support group activities; and to gain title to the common lands (Ibid.). Despite the fact that Lorenzo Jeffers had petitioned the General Court in 1962 to have the title to a portion of the common lands conveyed to the Indian descendants at Gay Head (Mass. House 1962a), it apparently came as a shock to many in the community to learn in the early 1970s that the common lands had legally belonged to the town since incorporation instead of the Indian descendants as they had always assumed (GHWT 1983:I:(c)14). Part of the motivation for creating the Tribal Council was thus to provide an incorporated body which could legally accept title to these lands (Ibid.:I(b).

In the spring of 1973 an alliance of non-Indian property owners, summer residents, and the more cosmopolitan Indian descendants organized the Gay Head Taxpayers Association (Vineyard Gazette 1973b). This organization was an outgrowth of the financial committee of the Gay Head Community Council which had been established in 1966. It proved to be more antagonistic toward the local Indian descendants over issues related to the town's financial management (Levitas 1980:518). By August of 1973 the organization claimed a membership of 70 families, including Tribal Council President Beatrice Gentry, who served on the Board of Trustees, and Lorenzo Jeffers, who drew up a statement of the organization's purposes. However, only 23 of its initial members were Gay Head voters (Vineyard Gazette 1973c; Pollan 1973). When representatives of the Taxpayers Association asked to meet with town authorities, the selectmen denied their request (Grapevine 1973c).

In the summer of 1973 the Tribal Council took its concerns about the Island Trust Bill directly to Senator Kennedy. It asked for his support in its efforts to gain Federal acknowledgment and to protect the Indian and common lands at Gay Head (Ibid. 1973b). The Council reasoned that its chances of gaining title to the common lands would be enhanced if it could gain Federal recognition as an Indian tribe (Ibid.; 1973a). Senator Kennedy's staff

responded favorably to these requests and the Island Trust Bill was allowed to die. Legislation for Federal recognition, however, was never introduced (Levitas 1980:438,554).

The Tribal Council then sought to have a warrant article introduced at the annual town meeting which would transfer the common lands to its control. In the face of strong advance opposition from the local Indian descendants, however, this proposal was withdrawn (Ibid.:557; GHWT 1983:I:(c)16). Thus having exhausted legislative means for gaining title, the Tribal Council decided to take legal action.

THE LAND SUIT

On November 28, 1974, Thomas Tureen, an attorney with the Native American Rights Fund (NARF), filed suit in U.S. District Court on behalf of the Tribal Council against the town of Gay Head for possession of approximately 238 acres of land (Vineyard Gazette 1981b). The town government introduced a motion to the court to have this suit dismissed, but the presiding judge refused to do so. The Indian descendants who were the town selectmen were thus placed in the awkward position of having to defend the town's interests against the Tribal Council (Dumanoski 1975). By the spring of 1975, fear had become widespread that the council's land claims would be extended to private lands throughout the Vineyard. This had the effect of placing a cloud on all land titles and thus freezing the up-island real estate market (Reston 1978b).

The tension caused by this situation persuaded even the most reluctant local Indian descendants that they should support the land transfer. Thus, on December 14, 1976, the town voted to turn its common lands over to the Tribal Council (Levitas 1980:557). However, the legality of this referendum was challenged by the town's own attorney and by the Gay Head Taxpayers Association, which argued before a Federal judge that the town's selectmen were not adequately representing non-Indian interests (Vineyard Gazette 1981b).

In the meantime, the Governor of Massachusetts signed an executive order in July of 1976 which stated that the "Tribal Council of Gay Head Wampanoag Indians are the recognized governing body . . . " of the Gay Head Indians (Grapevine 1976a). This same order gave all of the state's recognized Indians the right to use a reservation of land in the Freetown State Forest; a proposal which had been introduced initially by Lorenzo Jeffers in the 1930's (Ibid.)

The Tribal Council also succeeded in getting a number of its projects funded through Federal programs designed for Indians. For four years (1976-1979) the Economic Development Administration (EDA) provided an annual grant of approximately $70,000 to expand and improve shellfish production at Gay Head (New Bedford Standard Times 1976; Vineyard Gazette 1977a; Breslauer 1979). Federal funds were also received for the weatherization of homes, for the establishment of a solar greenhouse, and for the development of a tribal management system and cultural enrichment program (GHWT 1983:I:(c)19; Dumanoski 1975; Levitas 1980:552). Federal funds made available under the Comprehensive Employment and Training Act (CETA) were used to hire temporary staff for the Tribal Council office and the shellfish project (Grapevine

1976a). At least two group members also received Federal Indian services as individuals during the 1970's: one was admitted to the Institute of Indian Arts in New Mexico and another received medical services at the Fort Duchesne Indian Health Clinic in Utah (WTCGH 1973).

In November of 1976 there was an abrupt shift of power in the Tribal Council from those Indian descendants who had a more cosmopolitan perspective to those who had a more local perspective. Beatrice Gentry and the other initial officers were ousted in favor of Winonah Silva and her supporters. In relation to the common lands dispute, this election also represented a shift in direction which reflected a deep schism within the Tribal Council. One observer saw this split as being between the local Indian descendants who favored negotiation and compromise with the Taxpayers Association, and the more cosmopolitan Indian descendants who wanted to press the Non-Intercourse Act claims for as much land as possible (Levitas 1980:560)

The Gentry faction did not accept defeat easily and continued to challenge the new group leadership. This produced a great deal of turbulence at Tribal Council meetings. Insults and racial slurs were tossed back and forth and at least two meetings ended in physical encounters (Ibid.: 561). One of the leading cosmopolitans found the head of a deer with a knife driven into it in her mailbox and implied to the press that it had been placed there by her political opponents within the Tribal Council (Vineyard Gazette 1981b). This split in the organization was also made apparent in August of 1977 after a draft of proposed legislation to give the Gay Head Indians exclusive fishing rights in Menemsha Pond was leaked to the press. This caused a furor among the non-Indian residents of Chilmark, who subsequently hired an attorney to represent their interests in the land claims. Tribal Council President Wenonah Silva charged disgruntled members of the group with orchestrating this embarrassing leak (Breslauer 1977; Vineyard Gazette 1977b).

In May of 1977 the Tribal Council announced that it would seek to acquire an unspecified amount of land in addition to the common lands through Federal legislation (Cabral 1977). Fearing the worst, the Taxpayers Association agreed to support a transfer of the common lands to the Indian descendants if the Tribal Council would accept zoning restrictions on these lands. The taxpayers did not want to see the common lands commercially developed or excluded totally from public use since they provided access to beach areas. Negotiations ensued along these lines but ultimately proved futile (Levitas 1980:557-558; Dumanoski 1975).

Both sides then appealed to Governor Michael S. Dukakis to intecede in the dispute. In June of 1977 he appointed the Dean of the Harvard Law School, Albert M. Sachs, to serve as the state's mediator (Reston 1977a; 1977b). Negotiations continued and on November 17, 1978, the details of a proposed settlement package were revealed. This tentative agreement called for the Tribal Council to receive title to the cliffs, the cranberry bogs, and adjacent beaches, three parcels of land formerly held by the bankrupt Strock Corporation, and the Cook property at the mouth of Herring Creek in exhange for its promise not to press further claims (Ibid. 1978b; Vineyard Gazette 1981b).

The dissident faction of the Tribal Council was highly critical of this proposed agreement. Its most militant spokesman was Frank B. James, a Gay Head Indian descendant who lived on Cape Cod. In a letter to the editor of the Vineyard Gazette he concluded "that if we accept this proposal as it now

stands, we are not following the original intent of the land suit: ownership and control of what was meant to be when the town of Gay Head was incorporated in 1870. We will be Gay Head Indians in name only" (James 1979).

This criticism and the reluctance of the Taxpayers Association to press for a resolution almost caused the negotiations to collapse in the spring of 1979. The split among the Indian descendants became so severe that the Tribal Council could not even agree to vote on the proposed settlement (Reston 1979).

On May 19, Gladys A. Widdiss was elected President of the council, thus keeping its control in the hands of the Silva faction (WTCGH 1979). Mrs. Widdiss continues to hold this office.

In an effort to force the Tribal Council and the Taxpayers Association back to the negotiating table, the town selectmen petitioned the U.S. District Court in December of 1980 to set a trial date for the six-year-old land suit (Vineyard Gazette 1981b). Thomas Tureen, the Tribal Council's attorney then sent to the Taxpayers Association a new proposal claiming additional property (White 1980).

By the spring of 1981 it became clear that a settlement was stymied on the question of beach ownership. The Taxpayers Association wanted the town to retain a fifty-foot strip for public access (Ibid. 1981a). On July 17, 1981, the Massachusetts Attorney General moved to intervene in the land suit on behalf of the town and the Taxpayers Association, which had been admitted as a third party in the litigation, and this motion was allowed. This action was seen as shifting the balance of legal power to the town by giving it the benefit of the State's substantial resources, while the Tribal Council continued to be represented by NARF on a pro bono basis (Ibid. 1981b).

On June 25, 1981, the Wampanoag Tribal Council of Gay Head petitioned the Bureau of Indian Affairs for Federal acknowledgment of its existence as an Indian tribe (Widdiss 1981). Federal recognition was viewed by all parties in the land suit as strengthening the Tribal Council's legal position (Bamberger 1983d).

In August of 1981 the town voted against an out-of-court settlement and at the same time declined to authorize the funds necessary for the town attorney to prepare for trial. As one Indian descendant put it: " I'd be paying to have someone defeat myself" (White 1981c). Later that month, Robert C. Hahn, a Boston attorney claiming to represent 43 members of the dissident Gentry faction, petitioned to intervene in the land suit, demanding that the entire town of Gay Head be conveyed to the Tribal Council (Vineyard Gazette 1981a). The Tribal Council then filed a motion opposing this intervention (White 1981d).

On September 28, 1981, the Tribal Council approved the negotiated settlement by a vote of 115 to 60 (Ibid. 1981f). Although the dissident faction claimed that the election had been illegal; it nevertheless dropped its motion to intervene in the land suit (Ibid. 1981e).

In December of 1981, Robert C. Hahn filed suits in the U.S. District Court in Boston on behalf of the Massachusetts Indian Heritage Committee, an organization formed by Frank B. James of the Gay Head dissident faction and John Peters of Mashpee. These suits claimed title to 27,000 acres of land in

Gay Head, Mashpee, and five other Massachusetts towns (U.S. District Court 1981). The Wampanoag Tribal Council at Gay Head was listed as a defendant in this litigation and charged with conducting an illegal election (White 1981g). This suit was dismissed a year later on the grounds that the plaintiffs had no legal standing as an Indian tribe (Vineyard Gazette 1982). Hahn then appealed this decision to the U.S. Court of Appeals and to the U.S. Supreme Court (U.S. District Court 1981).

A NEGOTIATED SETTLEMENT

Meanwhile, the out-of-court settlement negotiations continued in an atmosphere of "acrimony and confusion" (Bamberger 1983b). Political tensions reached a peak in August of 1983 after the Taxpayers Association placed a full-page advertisement outlining its views in the Vineyard Gazette. Among other things, this ad criticized the Tribal Council for failing to either prosecute the land suit or negotiate a settlement and for opening up a new arena by petitioning for Federal acknowledgment (Vineyard Gazette 1983a). The Tribal Council responded angrily in a position paper which appeared as a letter to the editor of the same newspaper (Malonson, et al. 1983), and the town selectmen called for a special meeting in order to allow both sides to explain its position. This emotion-packed meeting proved to be a major breakthrough in the negotiations, despite the fact that representatives of the dissident Gentry faction walked out in protest (Bamberger 1983c; 1983f). Within a month the Tribal Council drafted a new settlement document, the substance of which proved to be acceptable to the Taxpayers Association, the town, and the State. Ironically, this agreement was very similar to the one which Albert Sachs, the State's mediator, had first proposed in 1978 (Ibid.)

As a concession to the Taxpayers Association, the Tribal Council agreed to withdraw its petition for Federal acknowledgment until such time as a settlement was ratified. At the request of NARF (Locklear 1983), the Bureau of Indian Affairs suspended active consideration of the Gay Head petition (Elbert 1983), which had commenced on July 28, 1983 (Shapard 1983).

The dissident faction protested the new settlement proposal. One of its spokesmen, Helen Manning, stated at a Tribal Council meeting that "this document does not go far enough to accomplish what was originally intended in order to preserve and maintain Wampanoag culture and heritage for our future generations . . . We oppose and condemn majority rule which can relinquish and wipe away these essential facets of our history and culture against the will and consent of the minority" (Bamberger 1983c). The dissidents then proceeded to obtain a temporary restraining order in state court preventing the Tribal Council from signing a settlement. They also filed papers requesting that their names be dropped from the Tribal Council's membership rolls (Vineyard Gazette 1983b). However, there is no evidence that the Tribal Council ever took action on this request.

On November 8, 1983, the members of the Tribal Council approved the settlement proposal by a vote of 164 to 29, and it was also approved by the twenty-member board of the Taxpayers Association (Cooper 1983). After a Federal judge dismissed the temporary restraining order preventing the Tribal Council from signing an agreement (U.S. District Court 1983), representatives from the Council, the Taxpayers Association, the town, and the State signed formal settlement papers on November 25, the town having voted for ratification by a

margin of 92-13 (Bamberger 1983g). Robert C. Hahn, now claiming to represent 110 Gay Head descendents, appealed the Federal court order to the U.S. Court of Appeals (U.S. District Court 1983). A month later, he testified before the state legislature that the Tribal Council did not represent the interests of the dissidents (Vineyard Gazette 1983c).

In order to be implemented, the negotiated settlement required the statutory approval of both the Massachusetts General Court and the U.S. Congress, in part because it requested a Federal appropriation for the purchase of part of the lands. Accordingly, legislation was introduced in the Massachusetts Senate and in the U.S. House of Representatives in the spring of 1984 (Bamberger 1984a).

In May of 1984, representatives of the dissident faction met with Governor Dukakis to explain their opposition and sent a position paper to the General Court (Ibid. 1984b). The Massachusetts Attorney General had earlier written to legislative leaders that he considered the Wampanoag Tribal Council of Gay Head to be the viable and legitimate representative of the Gay Head Indians. He had also pointed out that of the 104 individuals who were listed as being members of the dissident faction, only 8 were Gay Head residents, while 18 claimed membership in a Christiantown Indian group, and 10 others in a Chappaquiddick group (Kiley 1984). On May 21, 1984, the U.S. Supreme Court dismissed without comment the dissident's suit to obtain all of the land at Gay Head (Boston Globe 1984).

Because settlement legislation was not enacted in 1984, bills had to be reintroduced in the 1985 sessions of the General Court and the U.S. Congress. On May 15, 1985, the Tribal Council requested the Bureau of Indian Affairs to place its petition for Federal acknowledgment on active consideration once again (Malonson, et al. 1985), and this was officially done on June 6 (Elbert 1985a). On June 27 and again on October 1, Robert C. Hahn requested the Secretary of the Interior to order the suspension of active consideration of the petition until a compromise could be worked out between the dissidents and the Tribal Council (Hahn 1985a; 1985b). He was denied both times (Elbert 1985b; Vollmann 1985). On September 18, the state settlement bill was signed into law by Governor Dukakis (Mass. Acts 1985). Action on Federal legislation is still pending.

FUNCTIONS OF THE TRIBAL COUNCIL

The Wampanoag Tribal Council at Gay Head holds monthly meetings for its officers and periodic meetings for its general membership. Since its inception in 1972, it has elected officers, established by-laws and a membership roll, recorded its proceedings, and audited its finances. It has also directed a number of economic development projects and spearheaded group activities related to the land suit, the negotiated settlement, and its petition for Federal acknowledgment. It has planned and coordinated community and group projects, such as cleaning up Lobsterville Beach, maintaining the Indian cemetery at Gay Head, and directing the Cranberry Day events (WTCGH 1983b; 1983c; 1984f). The Council has served as a liaison between its members and the Massachusetts Commission on Indian Affairs, the Mashpee Tribal Council, the Indian Task Force of Burlington, Vermont, and other agencies and organizations (Ibid. 1983c; 1983d; 1984b; 1985a).

The Tribal Council has been successful in obtaining governmental assistance from both Federal and state sources. In anticipation of the group's receiving Federal acknowledgment, the Indian Health Service granted it $99,000 in 1984 to develop a needs assessment for a health services delivery system (Fleury 1984a; WTCGH 1984c). The Council created four administrative positions under this grant and conducted an extensive survey of the health needs of its membership (Ibid.; Fleury 1984b; Vineyard Gazette 1985).

In 1983 the Tribal Council also received a grant from the Administration for Native Americans (ANA) of the Department of Health and Human Services. This money was to be used to increase the effectiveness of the Council in addressing the social and economic needs of its members and to prepare its petition for Federal acknowledgment. The dissident faction sought to block this grant. In February of 1985, Robert C. Hahn filed suit against the Department of Health and Human Services charging, among other things, that the Tribal Council did not represent all of the Gay Head Indians and that the Federal Government had therefore violated its trust responsibility by funding one faction in an ongoing intertribal dispute. The U.S. District Court for the District of Columbia dismissed this complaint for lack of standing in August of 1985 (U.S. District Court 1985).

As of June, 1985, the Wampanoag Tribal Council of Gay Head claimed 521 members.

As noted previously in this report, the Federal census counted only 78 Indian descendants at Gay Head in 1980. Despite the fact that they are now the minority population, these people continue to view their town as an Indian community. This perception is also shared by outside observers. As Henry Hough, the late editor and publisher of the Vineyard Gazette and the island's most noted journalist, observed in 1970: "Gay Head today, is still at heart and in spirit an Indian town . . . " (Hough & Eisenstaedt 1970).

ANTHROPOLOGICAL REPORT ON THE GAY HEAD WAMPANOAG

INTRODUCTION

The Town of Gay Head on the western end of the island of Martha's Vineyard, Dukes County, Massachusetts is inhabited by two groups of people. One group is descended from the Gay Head Wampanoag Indians and the other is composed of non-Indians who began to move into the town of Gay Head in the early 1900's and who have become permanent residents in Gay Head. An increase in the number of non-Indians has shifted the long-held political base of the Gay Head Wampanoag and now the Indians are a minority in their own homeland. In response to these population and political pressures, some of the Gay Head Indian descendants have organized the Wampanoag Tribal Council of Gay Head (WTCGH) and have submitted a documented petition to the Bureau of Indian Affairs seeking recognition as a tribal entity.

This report is an anthropological evaluation of the group seeking acknowledgment. The first section will briefly examine the physical environment and the settlement pattern exhibited by the inhabitants of the town. Following that the population and membership of the group will be examined. Social relations will be discussed next before the past and present political organization of the group is described. Land tenure concepts will be examined. The summary will point out that the tribe existed until the 1870's. Since that time, due to a variety of factors, there has been a slow disintegration of community cohesiveness and tribal organization. By the late 1930's, the breakdown was virtually complete. While some vestiges of native culture are still present, the lack of any social cohesion or political authority of the WTCGH over their claimed members—not only those 78 in Gay Head but also those across the sound in southwestern Massachusetts —does not support a decision for Federal acknowledgment.

Since earliest historcial times, the Gay Head Wampanoag (also called Pokanoket) have lived in Gay Head. The Gay Head Wampanoag, an Algonquin-speaking group, were related to other Wampanoag groups on Martha's Vineyard as well as to those occupying southern Massachusetts (Salwen 1978: 161).

The town of Gay Head had lands and resources which were less desirable to the early white settlers and, as a consequence, it was an area where the Indians could continue their lifestyle without the pressures faced by those Indians occupying more productive lands on the island or mainland. Gay Head harbors were not as suitable to the early white seafarers as were those in Edgartown or Vineyard Haven. The first name for Edgartown was "Great Harbor" (Banks 1966: I: 28). The stunted trees at Gay Head, largely scrub oaks, were of little commercial value and the soils in general were not as desirable as those elsewhere on the island. Places on the island where these resources were more attractive were occupied early by the whites, forcing the Indians living in those areas into greater social contact with the whites. The Indians at Chappaquidick, an island at the eastern end of Martha's Vineyard, were also physically isolated from the rest of the Vineyard, but the Chappaquidick Indians were in closer proximity to the early center of white population, Edgartown, and access to Chappaquidick was not difficult. Chappaquidick Wampanoag lands were divided in 1870 and the Chappaquidick

lost their distinctiveness as Indians; their area did not continue to be known as Indian lands as was the case with Gay Head. The Gay Head Wampanoag were more remote and less accessible. Even after their lands were divided in 1870, they continued to be known as Indians and their lands as Indian Lands.

Documents demonstrate that a group of Gay Head Wampanoag inhabited the present town of Gay Head from early historical times to the present (see Ethnohistorical Report on the Gay Head Wampanoag). Documents also provide information about the community's geography and these indicate that the settlement pattern is not much different today than it was in the past, i.e., dispersed, isolated and somewhat private.

SETTLEMENT PATTERN

Beyond the historical record, the archeological evidence, although scant, suggests that the Indians on Martha's Vineyard lived as nuclear families in small oval to round houses on a seasonal basis. The floral and faunal remains from these small sites indicate that the people were hunters and gatherers of land and sea resources. The sites are scattered indicating that the houses were not in close proximity. This kind of settlement pattern, like Indians elsewhere in southern New England, is best described as dispersed (Salwen 1978: 160).

Maps also show Gay Head settlement patterns. One map published in April of 1776 (Atlantic Neptune 1776) depicts scattered dwelling sites mostly on the south coast side of Gay Head, although there are a few dwellings on the northeast side of town. A church is shown more centrally located. An 1858 map of Gay Head also shows scattered dwellings, but more houses are now located in central portions of the town and there are fewer shown on the south side. An intricate or warren-like road system is shown as well as approximate locations of dwellings with the names of the residents. Such a road pattern would have provided for easy access to neighbors and relatives. The school, the Baptist church, and a windmill, built in the 1840's were shown in a central location (Walling 1858).

A map published by the Old Colony Line Steamship Company is undated but probably dates to the 1870's. The intricate, warren-like road system still exists and the houses are scattered but adjacent to the roads. This road pattern makes Gay Head unlike other towns on Martha's Vineyard at this time.

When it was decided in the 1860's that the common lands of the tribe were to be divided in severalty, a survey and a map of the common lands and existing homesteads was ordered. This map shows scattered homesteads, with most of them being located on the south side of the town (Pease and Pease 1870).

Today, there are four principal paved roads in Gay Head: Moshup's Trail, which is the major access road on the southern side of Gay Head; State Road, which is an east-west road that traverses the central part of Gay Head; Lighthouse Road which is the northern equivalent of Moshup's Trail; and Lobsterville Road which branches to the north off State Road and joins Lighthouse Road at a point close to the coast (see Map #2). From this juncture, Lobsterville Road turns eastward among the sand dunes and cranberry bogs. Access to these main roads is by innumerable private driveways and an occasional older road such as Church Street.

While today Gay Head has no commercial establishments for its inhabitants, this has not always been the case. In 1907, some business were in existence. A city directory for this year displayed the ads for two grocery stores—P.A. Vanderhoop and Linus S. Jeffers and Company. The ads indicated that the stores had public telephones (Union Publishing Co. 1907). Also listed in the directory was a hotel and restaurant.

Shortly before the turn of the 20th century, Gay Head participated in the tourist boom which the entire island experienced. In response to the tourist trade, the Indians built a hotel to house and feed those who came to view the cliffs and the lighthouse with a famous lens. This was the Fresnel lens and it was so designed that its 1003 prisms could intensify the light of a candle creating a beam equivalent to 100,000 watts of electric power (Levitas 1980:319,330). During the tourist boom, another hotel and a

dance pavilion were built for the town's visitors. The steamship operations which brought the tourists to Gay Head from the mainland promoted tourism. Steamship operations to Gay Head ceased in 1907 (Ibid.: 325). The dance pavillion closed in 1912 (Ibid.: 325, 451), the last grocery store closed in the 1930's, and the last hotel closed in the 1940's.

Except for the small, Indian-operated souvenir shops, refreshment stands, and restaurant at the cliffs, all designed to serve the tourists, there are no other commercial establishments in Gay Head. Shopping for groceries requires trips to Chilmark or to further down-island towns such as Vineyard Haven, Oak Bluffs or Edgartown. Some shopping could be done on the mainland where the prices are cheaper. Before the paving of State road in 1938 and improved transportation, it was likely that shopping would take place in New Bedford across Vineyard Sound in southeastern Massachusetts. Fish and any surplus crops, such as cranberries, would be taken there to market. Trips to the mainland at the time were made by catboats (Ibid.: 267).

The small cluster of public buildings consisting of the town hall, fire station and old school building—now a library—form the center of Gay Head. To a stranger who might have expected a bustling business center as found in the down-island towns, there is little to call attention to the fact that this is the center of the town.

The dispersed settlement pattern in Gay Head has provided for privacy and isolation. In the past, the scattered houses were intricately connected with a warren-like road system which would have facilitated communication and social interaction between friends and neighbors. The change from this profusion of small interconnecting roads to basically four main roads which are accessed by private drives has greatly reduced the ease of physical access to neighbors and friends. Likewise, the disappearance of all commercial establishments (except those small souvenir shops which serve the tourists) serving the local inhabitants has contributed to the isolation of the inhabitants and reduced social interaction and communication.

INDIAN POPULATION AND MEMBERSHIP

This section will briefly examine the Gay Head Wampanoag criteria for membership and population through time. It will be noted that there are two periods of relative population stability on Gay Head, one spanning from 1807 to 1930 and another starting in the 1950's and extending to the present. Membership criteria changed in the past making it difficult to know precisely who was being included in the earlier population counts. The Federal census only includes the Indians resident in Gay Head. Today, the WTCGH claims 521 members, of whom 78 live in Gay Head.

While early colonial estimates of Indians on Martha's Vineyard ranged from 1500 to 3000, Levitas (1980: 90) demonstrates that it is reasonable to assume that in 1642 there were at least 3000 on the island. It was not until 1807 that population figures are given specifically for Gay Head (Freeman 1971). At that time 142 Indians were resident in Gay Head with about 100 absent. In 1849, the resident population was reported to be 162 with 12 "foreigners" and 10 men "at sea" (Mass. House 1849: 18). In 1870 there were 160; 1880 listed 161; 1890 listed 139; 1900 listed 173; 1905 listed 178; and 1915 listed 175 (Mass. House 1917). In 1910, 157 Indian residents are listed on the Indian census schedules taken by the Federal Government.

In the 1920 census, 126 Indians were listed as residing in Gay Head. The 1930 census listed 129; 1940 listed 98; 1950 listed 71; 1960 listed 77; 1970 listed 63, and 1980 listed 78.

The earlier population figures reflect some problems of who should be regarded as being a Gay Head Wampanoag. There are two issues—residency and spouses. While spouses generally have not been included as members, on certain occasions they have been.

In 1807, every native whether he lived off- or on-island was entitled to tribal privileges (Freeman 1971). By 1849, spouses of six Gay Head women who were either non-Indian or non-Gay Head Indians were involved in tribal affairs and signed a petition along with 11 Gay Head Wampanoag (Mass. House 1849: 87-88). It was also in 1849 that Gay Head Indians were complaining about children of Gay Head people who had left the island coming back and claiming tribal rights.

In the 1860's, membership in the tribe was generally limited to those Indians of known ancestry who lived in Gay Head. If Gay Head Wampanoags moved from Gay Head, they and their descendants were not recognized by the tribe and these persons lost all rights as members of the tribe (Earle 1861: 31, 38). In addition, those non-Indians who married into the group might be accepted as members of the tribe if the tribe thought it was to their advantage to concede this right (Ibid.: 31).

The 1870's division of common lands in severalty forced a decision on membership. Only members were entitled to lands, and residence was a major component. With rare exceptions, those who had left Gay Head were not given land (Pease n.d.).

Membership in the WTCGH as defined by their current by-laws is based on descent from the 1871 list of people who were considered to be Indians. It includes those descendants whose families have subsequently moved from Gay Head but it does not include spouses. When the WTCGH was formed in 1972, the issue of membership of spouses immediately arose. One member who later became president of the organization requested that spouses be included (Vineyard Gazette 1972b), but the officers made the decision not to include them.

In their petition for acknowledgment the WTCGH provided a list of 521 members, including years of birth and current state and city of residence when known. Of those on the list, 74 did not have year of birth and 27 did not have state and city of residence. There are 78 WTCGH members who live in Gay Head while 137 live elsewhere on the island, principally in the towns of Vineyard Haven or Oak Bluffs. Some 170 live in Massachusetts, with the majority of those in Massachusetts living across the sound in the southeastern part of the State. Another 110 live elsewhere in the United States. An overwhelming majority of the membership resides outside of Gay Head.

Until 1849, Gay Head Wampanoag membership was based on recognition by the group as being members; until that time residence was not the only criterion. In 1849, the Gay Head Wampanoags complained that non-residents' children were claiming tribal privileges. By the 1860's residence in Gay Head was virtually mandatory to share in tribal benefits, especially the division of communal assets. Today membership is based entirely on descent.

Since the WTCGH membership is scattered, social relations and communications are important for the maintenance of tribal affairs. Social relations and communication will be discussed in the next section of the report.

SOCIAL RELATIONS

In this section of the report, patterns of social relations will be examined. These observations are based not only on field data but also on the work of Gloria Levitas. Gloria Levitas, an anthropologist, who is a summer resident at Gay Head, spent many years in research on the town. She presented her research as a doctoral dissertation at Rutgers University. She extensively examined the social relations of the Gay Head people and focused her work on the Indians. Levitas provides evidence for a social change from communal cooperation prevalent ". . .during the last third of the nineteenth century and the first decades of the twentieth. . ." (Levitas 1980: 282) to more individualistic behavior after that. During this time, agricultural activities as well as fishing appeared to demand communal participation. She quotes one informant who describes "'a turning' out time in the spring, when you'd put all the cattle in the south. . .way over there on the South Road—and let them go together. . .the whole town decided on where they's [sic] put the animals to pasture" (Ibid.: 282).

Formerly, plowing of the fields was also a communal affair and tribal lands could be claimed by enclosing. This communal way of life began to disappear with the allotment of land in severalty in 1870. In those activities, e.g. pasturage, plowing and trap fishing which required community participation, Levitas notes that vestiges of the social/communal system persisted until the 1920's or 1930's (Ibid.: 221). Cranberry Day in the fall was also cooperative and the Indians would turn out to harvest the cranberries. Any excess berries were taken to the mainland and sold with the proceeds being used to care for the indigent and poor.

The shift in importance of communal relations appears to have had an economic and technological base. During the first quarter of this century, communal farming and grazing declined. The change from cooperative trap fishing—requiring 30 to 40 men to build the traps, maintain the nets and harvest the fish—to competitive boat fishing, a more mechanized activity requiring small crews, was also a factor in this change (Ibid.: 393). These changes led to a greater social and economic differentiation in the community since those who owned the boats and fishing-related machinery received a larger percentage of the proceeds.

At the turn of the century, there were still mechanisms encouraging social cohesion. The post office, established in 1873 by the Federal Government, provided a focus for activity. It was a meeting place for friends and neighbors and a source for casual gossip, b"t Federal consolidation in 1941 closed the facility and the inhabitants at Gay Head had to go to Chilmark for their mail. Later, in 1952, rural delivery was instituted in Gay Head (Ibid.: 451). In the first decade of this century, there were two grocery stores operating in Gay Head which provided a place for people from various sections of town to meet, and one of them also served as the post office.

The Gay Head Baptist church, the oldest Indian Baptist church in the country, provided a meeting place for that portion of the community which participated in church affairs. It served as a means of social control with its censure power and as a focus of cooperative activity when painting or repairs were needed. The church has declined in social importance to most Gay Head families. In a recent visit to the Gay Head Baptist Church, the Bureau's research staff noted that the service was attended by a small congregation of 19 people composed largely of older Indians and older non-Indian residents. There were also six non-Indian visitors to Gay Head. A Gay Head Wampanoag spouse and three of her daughters were the only younger people. The minister, who is

non-Indian, had come to Gay Head to present the service. Refreshments were served after the service, but most people left quickly after a short period of greetings and polite conversation. The small number of largely older people attending church is a phenomenon which Levitas also noted in the 1970's. She reports that ". . .an ordinary Sunday sermon rarely attracted more than ten or fifteen people—generally the oldest members of the community" (Ibid.: 495-496). In 1985, the church was being prepared for painting. Upon inquiry it was learned that the work was contracted out, with most of the money for the work coming from the non-Indians of the congregation. Although the church served a socially integrating function in the past, it no longer has that role.

The school in Gay Head was once part of community activities, but it too has lost that function. In the 1920's, Gay Head Wampanoag high school students were bused to other schools on the island. In 1966, the grade school was closed and now all the children are bused to other schools. No longer do school activities provide a focus in the community.

Today, the Gay Head Wampanoag have no events that are attended exclusively by their members. This lack of any mechanism to renew social relations periodically has been observed by Levitas. She states "the lack of community celebrations is striking, and. . .[her] notes support a hypothesis, suggesting that internal cohesion, measured in terms of community sociability had declined. . ." (Ibid.: 384). During her research on Gay Head, Levitas collected a complete file of Gay Head-related social events which were recorded in the Vineyard Gazette for 1950. An analysis of these newspaper clippings reveals that for that year only five of 428 social events were community-wide. She also noted that trips to the mainland were mainly for shopping and the visiting of relatives. She concludes that community sociability was not as important to the Gay Head Wampanoag as the maintaining of kin and friendship ties outside of Gay Head (Ibid.: 384).

Prior to 1939, Cranberry Day was a communal Gay Head Wampanoag affair. On the appointed day, generally in October, the Gay Head Wampanoag Indians would gather to harvest the cranberries. The women would cook the food and all would participate in the harvest. It generally was an all-day affair. According to the acknowledgment petition, it still is a kind of homecoming and social renewal. The 1939 hurricane did irreparable damage to the bogs and they no longer produce as they once did.

The Acknowledgment staff notified the WTCGH president that one of the investigator's visits would coincide with Cranberry Day. It was anticipated that off-island WTCGH members would attend and they might be interviewed. The events started when about 20 Gay Head Wampanoag school children arrived by bus at the Town Hall. The children listened to a talk about Gay Head Wampanoag history and then had a walking tour of the old cemetery. They were then taken to the cranberry bogs. The WTCGH president explained the procedure for picking. Prizes—various Indian-style trinkets—were offered for the most berries picked. At a signal, the children began picking. Lunch was served afterwards. For some of the children, this was their first visit to Gay Head, and others said they had not been there since they were very small. This indicates that down-island families do not visit in Gay Head often. At the bogs there were approximately 10 Indian adults but no members from off-island. One of the officers of the group who attended is from Oak Bluffs. The group's attorney was also present.

That evening there was a gathering at the Town Hall to which the public was invited. Tables displayed items of interest to Gay Head Wampanoag residents, e.g., family photograph albums, Indian artifacts collected in the vicinity, and fired and unfired pottery made of clay from the cliffs. The evening started with a showing of home

movies which recorded various family activities. There were scenes of graduations and weddings. It was apparent that these functions were attended by a relatively small gathering of immediate families. Following the video tape showing, one of the council members told a few Wampanoag myths. Refreshments followed. Those attending the evening function were largely those who serve on the council board of directors, their spouses and children. At least one non-Gay Head white couple who were vacationing at Gay Head attended.

The poor attendance at Cranberry Day indicates that this celebration no longer has the socially integrating functions it once had. Although it follows an earlier format, e.g., picking cranberries and eating dinner at the bogs, the event now serves as an Indian heritage day to reinforce Gay Head Wampanoag Indian identity.

Funerals can be events promoting community solidarity. In Gay Head, however, funerals generally were not community affairs and they are attended primarily by the family and friends of the deceased. Some Gay Head Indians, residents of Vineyard Haven, reported they would attend funerals held in Gay Head if the deceased was a relative or close friend. During this interview, the pronoun "they" was used consistently in referring to the Indians in Gay Head, indicating that there was no feeling of association or identification with the Indians there.

Along with the lack of strong community celebration to promote cohesiveness, a pattern of outmarriage has contributed to the individualistic character of the community. Since the 1930's, nearly all Gay Head Wampanoag marriages have been to non-Gay Head Indian partners. While the Gay Head Wampanoags have been traditionally Baptists, some of these marriages have been to non-Baptists.

Levitas points out that other changes have occurred that have promoted family isolation and decreased social cohesion. Before television there was more family social interaction, especially between children and adults. Children, before television, would be entertained by the adults relating local legends and ghost stories. Some of these had Indian themes. Today the children watch television or go to the down-island skating rink or movie houses. Some children have joined island-wide scouting activities and thus have widened their peer groups (Ibid.: 495). Since none of these activities is available in Gay Head, the children are transported to the other towns by their parents.

Another factor that could affect social cohesiveness is the off-island migration in the summer, which was mentioned by the researcher for the petition. No evidence was found of an extensive pattern of this type.

There were instances in which individuals who had second homes in Gay Head moved into their smaller summer homes and rented their larger winter homes. Some Gay Head Wampanoag maintain homes both on the mainland as well as in Gay Head and commute back and forth. In winter, some Gay Head Indians who run shops at the cliffs close them and move off island. These are not regarded as widespread patterns but reflect more particularistic behavior. Levitas' discussion of the employment of Gay Head Wampanoag men does not report any seasonal migration of workers.

The whites who have recently established residence in the area tend to be affluent professionals who first began to vacation in the town and later decided to build homes there and move to the town. Many have substantial homes. Since they moved to the town for privacy and relaxation, they—like the Indians—have the same isolated settlement pattern. These newcomers are concerned that should the Indians win their

land suit, their isolation will be destroyed and/or that an "undesirable" business such as a fish processing plant will be established.

The social relations of the Gay Head Wampanoag and their non-Indian neighbors is not extensive. Both groups, while they interact in political matters, limit other social contacts. White neighbors of the Gay Head Wampanoag think of them as racially mixed. The Indians have intermarried with whites, blacks, and other Indians. They are phenotypically diverse. The blood degrees of Gay Head Wampanoag on a list prepared in 1792 by a Gay Head Indian shows over half of the members with various degrees of mixed blood. The racial background of the Indians and the socio-economic differences between many of the local Indians and their new, white neighbors contribute to the maintenance of social boundaries. While some visiting between the Gay Head Wampanoags and their white neighbors occurs, it is not especially common.

In any society, informal and less obvious communication networks can exist enabling an individual to be aware of important social or group issues without their attending meetings or participating in group activities. An attempt was made to determine if such informal networks existed among the Gay Head Wampanoag. Considering that some down-island Gay Head Wampanoag know so little about WTCGH affairs, it is suspected that if a telephone network exists, it does not appear to be inclusive. Those on the Board of Directors and some dissident members maintain telephone communication with their respective groups. Brothers and sisters seem to maintain close telephone contact and they can generally tell what their siblings might be doing on a particular day, but they seem to know little about activities in other families. If informal communication networks exist, they are so subtle that such network have not become evident even after a great deal of research. Neither Levitas, Grabowski, nor Campisi, all anthropologists who have studied the Gay Head Wampanoag, has specifically described or implied any such informal system operating.

Evidently, communications of council matters with members has been largely by newsletters. The idea of a newsletter was not discussed until 1975 (WTCGH 1975). This suggests that prior to the newsletter, information about the group's activities had a limited distribution and was not being disseminated widely to its members. Even the newsletter has not been wholly effective in generating substantial interest in council matters, since some Gay Head Wampanoags interviewed said that they received the newsletter but they did not pay much attention to it.

The Gay Head Wampanoag were not isolated from the early pan-Indian movements. One of its first expressions in Gay Head came after the Governor of Massachusetts, Sam McCall, honored Gay Head with a plaque of recognition honoring the fact that more men from Gay Head, in proportion to its population, served in World War I than men from any other town in Massachusetts. There was no mention of the fact that most of these men were Gay Head Indians. The town corrected this oversight fifteen years later (1933) by awarding itself with a plaque honoring these men and their Indian heritage (Levitas 1980: 372). At this event, many Indians from off-island attended and many, including some Gay Head residents, wore plains Indian-type costumes. Some wigwams or Indian houses were constructed at the Head. For a few days these ceremonies "recreated a sense of community" (Ibid.: 380). This was not entirely a Gay Head Indian affair since some of the off-island Indians were involved in the planning. This plaque ceremony honoring the Indian ancestry of the Gay Head men may have been influenced by the creation of a branch of the Wampanoag council in Gay Head in 1928 (Ibid.: 392).

In Levitas' discussion of pan-Indianism she refers to the types of Indian personalities found in situations of acculturation presented by George and Louise Spindler (1957:147-

157). These are (1) native types, (2) marginal or transitional men, and (3) reaffirmative native types. She states:

> One group are 'native types' who present to the outside world an air of equanimity in the face of change and its insults that make social intercourse pleasant. Such people accept their fate and tend generally to avoid actions that might arouse anger and hostility. Native types seem to be those whose local anchorage is secure; they generally have lived in the community much of their lives, and maintain local rather than extralocal networks (Levitas 1980: 397).

She quotes the Spindlers in describing marginal or transitional men as:

> . . .marked by at least one feature held in common: they are still fundamentally Indians in basic psychological structure, if this structure is badly corroded by regressive breakdown. . .represented particularly in the loss of emotional controls that are so important in the traditional setting. These transitional people are unpredictable. . .They are the unknown quantity in tribal decision-making and shift abruptly fromone stance to another in general councils where problems oftribal policy are thrashed out. . .(Ibid.: 155-156).

> The third group is called 'reaffirmative native types.' These men and women hope to recreate community sentiment. They are frequently. . . people who have had contact with whites through college or the army and who have been unable to adapt and return to their natal homes or traditional primary groups to seek affirmation in ceremonial forms (Ibid.: 398).

In applying this model to the Gay Head Wampanoags, the "native types" appear to have predominated in Gay Head during the time of the town's incorporation and up to the time between the wars. They were content in their self-identification as Indians and they saw little need for programs promoting Indian arts and crafts or Indian heritage (Ibid.: 399). The "reaffirmative native types" are preponderant in Gay Head today and were emerging as a force in the 1920's and 1930's (Ibid.: 399).

Levitas categorized Lorenzo Jeffers, a controversial man, as fitting the marginal man concept (Ibid.: 402). This gentleman, a former student at Carlisle Indian School in Pennsylvania, was a community activist and invoked considerable change and/or controversy in Gay Head. He was active in off-island pan-Indian organizations; encouraged State involvement in training of town officials; brought the "irregularity" in town management to the attention of State authorities; was President of the Federated Eastern Indian League in 1961; introduced the two-party system into the community; was elected head of the Pokonoket or Wampanoag Council in Mashpee on the mainland; attempted to get voting rights for those non-residents who paid taxes to the town and some who claimed voting rights on the basis of kinship; attempted to establish a reservation on the town's cliff lands which were viewed as an economic resource by the town; and was involved in numerous other controversial endeavors.

The town clearly denied him and his expression of "Indianism." In 1974, his

> . . .funeral was an interesting event—particularly because it differed considerably from the funeral of another man who died the following year, and the disparities indicated the nature of the social and symbolic ties of. . . [reaffirmative native types] and locals to the community. . . [his] funeral was attended only by his close relatives and numerous off-islanders. The church was filled beyond capacity, although no other members of the local community were present. Among the off-islanders who came to pay their respects were several Indians of other northeastern tribes, and a great many representatives of state and county government. An elaborate floral arrangement in the form of an Indian. . .[headdress] was laid on the grave. The Lord's Prayer was read in Algonkian, and there were telegrams from Ted Kennedy and other officials of the Democratic party, and from prominent leaders of the national Indian movement.
>
> The second funeral was held for a fisherman—the son of a native prominent in town affairs. The local community turned out in force —along with many of this man's friends from other island communities, and a few off-island friends and relatives. The service was Christian and no Indian symbolism was in evidence. (Ibid.: 614)

Funerals for less prominent people are attended largely by immediate families and friends.

Among other things that Jeffers introduced to Gay Head was a museum. In 1952, Jeffers proposed a "Museum of Gay Head History" (Ibid.: 484). It had exhibits in various buildings in Gay Head. In 1963, Jeffers changed the name to "Gay Head Museum of Indian and Whaling History" (Ibid.: 485-486). He shocked the community in 1967 by first closing the museum and then having a community meeting in August and announcing there would be a newer and better museum. One condition he required for participation in the new museum organization was that one had to have Indian "blood" and that any financial contributions from "white persons or persons of color" would be rejected (Ibid.: 486). It was at this meeting that the first mention of Red Power was made. The new corporation never reopened the museum. By openly rejecting non-Indian support for this museum, Jeffers did bring to the attention of Indian residents in Gay Head the fact that they were losing control over the community (Ibid.: 487).

One of the organizations that assisted Jeffers in his original museum endeavors was the Aquinnah Club. This organization, composed of both Indians and non-Indians, was active for a short period of Gay Head's history (Ibid.: 499). In coalition with some of the summer residents, this organization was instrumental in bringing electricity to the town. One hot day in July of 1951, when the town hall was totally filled with 100 or more town people who had come to listen to representatives from the electric company explain why the town did not have electricity, the generator supplying power for the electric fans "failed." Everyone stayed until the power company officials agreed to provide power to the town. On issues critical to the town, the community development organizations composed of both Indians and non-Indians have always worked as teams.

Summary

Though communal activities were common at the turn of the twentieth century, a change to privacy and individualism has taken place. The change from communal land holdings and communal work patterns to lands held in severalty and individual and competitive work styles has eliminated the Indian's social cohesiveness. The decline of the importance of the church, the 1938 hurricane which destroyed the productivity of the cranberry bogs, and the lack of any Indian or non-Indian social institutions which would promote cohesiveness has created a highly individualistic community where the principal ties are to the nuclear family.

Various Indian organizations have been in existence in Gay Head at various times since the 1920's. It was the activities of Lorenzo Jeffers which eventually led the "reaffirmative native types" in the community to create a new organization—the WTCGH —whose petition for Federal acknowledgment is under review and evaluation.

As will be seen, the lack social cohesion within the Indians' community is reflected in the Gay Head Wampanoag Tribal Council's inability (1) to create sustained interest in issues defined by the officers of the group, and (2) to promote attendance and participation in the group's activities.

POLITICAL ORGANIZATION

In this section of the report, the political organization of the Gay Head Wampanoag will be reviewed briefly. An historical approach will be taken starting with the earliest records and continuing to the present. A tribal political system existed up to the 1930's, but the breakdown of the system began after the 1870's division of the common lands. During the 1900's, the slowly changing socio-economic system of the Gay Head inhabitants contributed to the decline. Today, the town is the only governmental organization in Gay Head and the WTCGH is an organization without broad support in its claimed membership.

In aboriginal times, the Gay Head Wampanoags were organized socio-politically by extended family units. The families were led by a council of elders and a chief or sachem. While some disagreement exists among observers (see Winslow 1910: 345; or Maeswoms 1909: 109) over inheritance versus election to the position of sachem, both could have been involved. While the chief or sachem position normally was based on heredity, his authority could only come from consensus of the people. It is likely that if a leader was unpopular he could be replaced. Similar situations existed elsewhere, e.g., Northwest Coast, Southeastern Indians, where "hereditary chiefs" could be deposed (Duffield 1983: 9-10). At any rate, the leader's power was "circumscribed and dependent upon the consent of the members of the village as well as the leaders ability to persuade" (GHWT 1983: I: 9).

Martha's Vineyard in late aboriginal and early historic times was divided into various geopolitical divisions (Banks 1966: I, Map, p. 40). Banks describes four sachemships or independent governmental units in existence on Martha's Vineyard and he notes (1966: I: 40) that the sachems and leaders were not always from the Vineyard.

In 1675 a dispute arose over the sachemship between Mittark and his elder brother Ompohhannut. The chief men of the island formed a council including some from the mainland (Banks 1966:I: 40) and decided that Ompohhannut was entitled to lands in Gay Head. The interaction of these various chiefs demonstrates that a political system was in operation that loosely tied together various political subdivisions. Although they were interdependent, there was no centralized authority over these alliances (GHWT 1983: I: 10). This type of group interaction may have been reinforced by intermarriages between Gay Head Wampanoag and other Martha's Vineyard groups and those from the mainland Wampanoags as well.

After the 1680's when Joseph Mittark, the last sachem of record of Gay Head, "sold" the lands of Gay Head to Thomas Dongan (see Ethnohistorical report on the Gay Head Wampanoag), the governance of the group evidently was in the hands of a council with a spokesman. In 1727 Eliah Coshoman and 10 others were involved in a property transaction in Gay Head with the Corporation for the Propagation of the Gospel also known as "The Company" (Dukes County 1859-1895). That same year another land transaction was recorded granting land to that same organization by Peter Ohquonut and others. It was in 1727 that the problems associated with the Company's leasing of lands in Gay Head to Ebenezer Allen culminated. By these agreements, the Gay Head Wampanoags allowed the Company to lease 800 acres to Allen. The rest of the lands in Gay Head were considered as property of the native inhabitants. Since there is no clear designation of leaders involved in these property agreements and the two agreements in the same year were initially signed by different individuals, it suggests that the group was operating by consensus with no specified leader.

In January of 1746 the Massachusetts House of Representatives, perhaps in partial response to two petitions from the Gay Head Indians, appointed three guardians for the tribe. At the same time the House appointed guardians for all the Indian plantations in Massachusetts (GHWT 1983: I: 27).

Several complaints against these overseers were received by the colony and one petition received in 1749 was signed by 34 members of the tribe (Ibid.: 28). The tribe continued to submit complaints even after the Revolutionary War. During this time, two Indian names are prominent, suggesting they were formal or informal leaders. These two individuals were Zachariah Howwaswee and Josef Pomel. In 1785, Howwaswee was appointed by the colony as one of the overseers at Gay Head.

During the 1700's, the tribe acted autonomously, retaining the prerogative of political decision making. The fact that in 1796 they transferred title to the land to the State which in turn transferred the land to the Federal Government for a lighthouse shows that the Indians controlled the lands in Gay Head. The decision-making process at this time was shared by both males and females.

In the 1810's, some dissension among the Gay Head Indians appears. Led by Zachariah Howwaswee, ten men and women who claimed to be "the few remaining Indians of Gay Head" petitioned to have overseers appointed. This claim may have been in response to the large number of intermarriages that had taken place (Howwassee 1792; GHWT 1983:I:34).

The main body of Gay Head Wampanoag Indians challenged Howwaswee and his group's petition (Ibid.: 35). The main body in their petition listed their choices for guardian, treasurer, and clerk. By 1810, the Gay Head Indians had a lawyer to help them defend challenges that had been made to ownership of some of their lands. In 1827, their system of government is described and it appears to be an informal town structure. In that year they were holding town meetings in which one member presided. They had selected a clerk, overseer of the poor, and other officers. In addition they had audits of the tribal accounts. Women voted in these elections as well as the men (Mass. House 1827: 9-10).

In 1849, a committee investigating conditions at Gay Head reported:

> For about thirty years, they have been without any guardian, and the division of their lands, and indeed the whole arrangements of their affairs, except of the school money, has been left to themselves. None of the lands are held, as far as we could learn, by any title, depending for its validity, upon statute law. The primitive title, possession to which has been added enclosure, is the only title recognized or required. The rule has been that any native could, at any time, appropriate to his own use such portion of the unimproved common land as he wished, and, as soon as he enclosed it with a fence, however a frail structure, it belonged to him and his heirs forever. That rule still exists (Mass. House 1849: 20-21).

Another study of Gay Head was reported by John Milton Earle in 1861. He reports:

> The municipal organization consists, mainly of three overseers, a clerk, treasurer, school committee, and committee on public lands, and by these their municipal affairs are regulated and managed. (Earle 1861).

In 1862, the Massachusetts legislature allowed its Indian citizens to be enfranchised as long as they would follow certain procedures for registration. This same legislation created Gay Head as an Indian district (Massachusetts Act 1862: 149). The Indians were not willing to follow the procedures outlined for enfranchisement and the problem of equality, as seen by the State, was still not resolved. Another study was made which recommended full citizenship for all Indians and the division of common lands (GHWT 51).

These actions prompted controversy within the group at Gay Head. In response to the division of Gay Head lands in severalty and enfranchisement, petitions came from opposing groups. One group was requesting the action and the other side was opposing it. In 1869, the selectmen Aaron Cooper, Thomas Jeffers and Isaac Rose (a non-Indian married to a Gay Head Indian woman), petitioned the House of Representatives to allow Gay Head to remain a district for a few more years and not be enfranchised. They claimed that they could not support the schools and could not fund the minister. They also pointed out that the survey of land boundaries was not complete and they did not want to be included with the town of Chilmark. The petition stated that this position was unanimously approved at a town meeting held January 1, 1869.

While this decision may have been unanimous in January of 1869, by May a petition to the House of Representatives signed by eight Gay Head inhabitants requested enfranchisement and division of the common lands. This petition was signed by Abram Rodman, Rosanna G. Rodman, James Diamond, Abiah Diamond, Josiah Jered, Samuel P. Haskins, John Randolph and Serena Randolph. Levitas (1980:216) points out that Abram Rodman was a Narragansett born in Rhode Island, James Diamond was born in Waterford, New York, and John Randolph was born in Santo Domingo. Each of their respective wives was born in Gay Head.

This did not settle the problem. By the following year several more petitions were filed. On September 1, Isaac Rose had evidently had a change of mind and with others submitted a petition to the Judge of Probate requesting the "set off"; i.e., division of the common lands. Seventeen people signed this petition including nine women. Isaac Rose and James Diamond were the only non-Gay Head Indians to sign the petition.

To counter the September 1 petition, another was filed September 7, 1870, directed to the Judge of Probate Court; it was signed by 16 inhabitants of Gay Head. This petition requested the judge not to take action on the petition of Rose et al. Four of the signers were not born in Gay Head—Johnson Peters, George J. Belain, William A. Vanderhoop and William Jeffers.

The controversy continued. On October 17, 1870, a third petition was sent to the Judge of Probate supporting the division of the lands. This petition contained six signatures, including those of two who were non-Gay Head Indians but who were spouses of Gay Head Indians. One was Abram Rodman, a signer of the May petition, and the other was William Jeffers who originally opposed the division of lands but now was supporting it.

This controversy of the land division and the incorporation of the town is poorly known and no records of the specific issues exist for the opposing positions. It does not appear that either group desired more land. Common lands could be claimed by enclosure by those who wanted it. Also, the controversy did not involve solely the issue of economics because many of those who signed the petitions, either pro or con, were

successful farmers. The fact that two individuals who originally opposed the division shifted their positions to favor the division suggests that the issues were more subjective. Bad feelings must have been generated within the community. Serena Randolph, who supported the division and enfranchisement, was very unhappy. Later she is quoted as saying "I wished I had never set foot on Gay Head" (Levitas 1980: 216).

This controversy does illustrate that the loose consensual form of Gay Head government was not strong enough to handle an issue of such magnitude, especially when feelings were so divided. The division of land and the creation of the town did initiate the gradual disappearance of their tribal way of life.

In 1870, once the town system was in place, Gay Head became involved more directly with the government of the State. However, from the date of the town's incorporation until 1955, the history of the town governmentis not well known, since the town records were destroyed by a fire in that year. What is known has to be reconstructed from external sources. It is known that the first town clerk was William A. Vanderhoop, who was against the division of the lands. He was succeeded in this post in 1873 by Isaac Rose, who was for the division of the lands. Rose held this post for 15 years. In 1910, Charles S. Hatch, a carpenter who was living in Gay Head but who was white and unmarried was elected auditor. At the time, there were 13 people living in Gay Head who were non-Indians and not married to Indian spouses (Bureau of Census 1910). Considering the fact that the population during the town's early history was largely Indian, the low number of non-Indians in office is not surprising.

WTCGH Political Organization

The WTCGH organized in November 1972, operates under by-laws adopted by the group in February 1977. There are regular monthly meetings as well as an annual meeting which is generally held in November. Their by-laws allow for special meetings when necessary. The meetings are open to their membership and occasional guests. They meet at various places in Gay Head, but for the most part they utilize the centralized location such as the Town Hall. This is within a 1.5-mile radius of all Gay Head. They have never met outside of Gay Head in towns such as Oak Bluffs or Vineyard Haven, nor have they met on the mainland where a large percentage of their membership resides.

Attendance at these meetings is very low and represents a very small number of their 521 members. At their best-attended annual meeting in the last five years, there were 22 people present. During these years, seven people have attended all five annual meetings; two have attended four of the meetings; and three have attended two of the meetings. Twelve people have attended only one of the last five meetings. Of those attending, 17 are from Gay Head, three are from Oak Bluffs, and one is from Vineyard Haven. The latter two towns are about 20 to 17 miles respectively from Gay Head and there are 137 members living in the down-island towns. Four people who live off-island attended during this period. Of these four, two are children of a former president and one is presently a board member. Only one of the off-island people has attended two meetings—this person's mother lives in Gay Head and is a former president.

Council meetings are generally held monthly. During the period between September 1979 and March 1985, minutes and attendance sheets for 31 meetings were examined. During this six-and-a-half-year period, the meetings with the highest attendance were in January 1981 and October 1983; at both there were 19 members present. During this period 25 different people who attended were from Gay Head, nine were from other

towns on Martha's Vineyard, eight were from Massachusetts and three were from Rhode Island. During these years there were 18 others who were either visitors, spouses, or members whose addresses were not known. Of those from Rhode Island, two are children of the previous president and another attendee is a sister to one of the original founders of the organization who presently lives in Gay Head. The average number in attendance was 14.

Using these same records, quorums at the meeting can be examined. At the regular or council meetings, a quorum of 15 members is required to conduct business. At two-thirds of the meetings, a quorum was not present. Of the last five annual meetings, three had a quorum. The majority of those in regular attendance are members of the same family. Those most consistently present include the current president; her three sons, one of whom is the tribal coordinator; the president's brother who is the honorary chief, and his wife who is a board member.

Considering the low attendance at the regular or annual meetings, it would be expected that for group cohesiveness that council issues would be disseminated and discussed in some manner. As previously mentioned, the WTCGH sent out newsletters but no informal network for disseminating information exists. During telephone and personal interviews conducted by the Acknowledgment staff with WTCGH members living in Oak Bluffs or Vineyard Haven, some said they knew little, if anything, of what was going on. One person did not know if he was even on the membership list. Another said that he did not know he was a member until he started getting mail and yet another said he was not interested in the group and never attended the meetings.

Town of Gay Head Government

The government of the town of Gay Head is structured by the laws and regulations of the Commonwealth of Massachusetts. The town documents were destroyed so that much of its early history has to be reconstructed using sources such as newspapers, county or State documents and oral history. There is nothing in these documents indicating that the town functioned in any manner different from other New England towns. Throughout its early history, the town officials were largely Indians, but some non-Indians were elected to town office. Today, while many of the elected officials of the town, including the selectmen, are members of the Gay Head Wampanoags, the current moderator who chairs the meetings and makes appointments to various committees is non-Indian.

Non-Indians who have been residents of Gay Head since 1972 and who have lived elsewhere in New England where there are town governments report that they see no difference between the town of Gay Head and other New England towns. They point out that Indians and non-Indians work on various committees together and that one of the Indian selectmen has a strong following of younger non-Indian residents in the community. These informants did not feel that the Indians "controlled" the town. When questioned about their use of the term "Indian community," they explained that the term meant those year-round residents who had been there a long time and who were racially different.

The poorly attended WTCGH meetings contrast with the well-attended town meetings and town elections. The turnout of Indian voters and the number of Indians who hold town office indicate that the Indians are not politically apathetic in town issues. While

there is no readily available list indicating the number of Indians versus non-Indians in attendance at town meetings, judging from newspaper reports both groups are represented. In 1974, 50 voters were at the town's annual meeting (Vineyard Gazette 1974). In 1975 there were 119 registered voters, and at least 55 attended the town meetings. In 1976, 34 voters were present at the town meeting (Grapevine 1976b).

In the town's annual election, which is held at a different time than the town meetings, good turnouts are recorded. In 1973, there were 133 registered voters, both Indians and non-Indians. That year, 103 ballots were cast in the annual elections (Vineyard Gazette 1973a). In 1976, there were 109 voters casting ballots in Gay Head (Vineyard Gazette 1976). Turnouts of this magnitude would suggest considerable participation of the Indian inhabitants in town affairs. Newspaper accounts, in quoting various people attending the meetings, indicate that the Indians are actively involved in the town's operation.

There is no strong evidence that action taken on issues faced by the town splits along racial lines or that non-Indians believe that the Indians, working as a cohesive group, are attempting to control the town. In February 1975, the town's Indian selectmen were faced with a proposed agenda article, "To see if the town will vote to refuse to authorize the selectmen to extend any funds in the defense of the action of the Wampanoag Tribal Council of Gay Head, Inc., versus the town of Gay Head" (Vineyard Gazette 1975). Two of the three Indian selectmen refused to allow it to be added to the agenda on legal grounds, while the third Indian selectman felt it should be added. A WTCGH spokesperson said that the article was drafted to permit an opportunity for debate (Ibid.). Before the meeting, the town's Indian moderator resigned. In response to these actions, a WTCGH spokesperson commented, "It seems to me they don't want to have the action discussed at all. . ." (Grapevine 1975a).

The issue was so heated that by the time of the annual meeting, several procedural mistakes were made. The new moderator was improperly selected, five of the seven finance committee members (only two of the committee members were Indians) had resigned, and apparently the town agenda had not been properly reviewed. After the meeting began all of these problems surfaced and the town's people voted 28 to 21 to adjourn without considering the agenda. Tempers ran high and there were sharp words between various town officials regardless of whether they were Indian or non-Indian (Vineyard Gazette 1975).

This event did make clear that the Indians of the GHWTC felt that the town was not under Indian control. In a letter to The Grapevine they listed 25 people in town government who were not Gay Head Indians. Some of those listed were spouses of Gay Head Indians (Grapevine 1975b). This case shows that the town's Indian officials were acting on behalf of the town and that their decisions were not made along racial lines.

In 1973, a political group called the Gay Head Taxpayers Association was formed. This group was composed principally of non-Indian residents and it included several Gay Head Wampanoags, including some on the board of directors of the WTCGH. This newly formed group felt that the town's financial procedures were inadequate and unfair. They focused their attention on the high real estate assessments, the town's expenditures, and procurement procedures. It should be pointed out that the town officials who were responsible for these activities had no specific training. They kept records in a manner that made analysis of expenditures difficult. In analyzing the town's finances Levitas had to use a variety of sources to compile figures for 1968, 1971, and 1976. Her study

shows that the high real estate tax assessments were necessary and were due to: (1) the relatively small number of landowners in Gay Head compared with other Vineyard towns; (2) the costs of programs mandated by the State; and, (3) the costs of services to the town demanded by the taxpayers (Levitas 1980: 517-534). In response, many paid their back taxes. The audit report recommended that the town treasurer, who at the time was a non-Indian, take action for foreclosure.

The town at various times in the past has not collected taxes in arrears. A state audit in 1969 reported that some real estate taxes were outstanding and dated as far back as 1945. Some motor excise taxes were as much as 16 years delinquent. It is apparent that the town had not been rigorous in attempting to collect these back taxes. During the town audit, letters were sent to some taxpayers requesting confirmation of the past-due amounts.

In response to previous pressures from the State in 1938, some Gay Head Wampanoag lands had been sold for failure to pay taxes (Ibid.: 419). This action created hard feelings in the community. For many of the delinquents, however, the problems concerning their lands were resolved and the owners were able to retain their property.

Summary

In the Gay Head Wampanoags' early history, there was a political system headed by a chief or sachem. In the late 1600's the position of chief disappeared, and by the early 1700's a consensual form of government was in place. This type of government was easily integrated into the New England form of town government. By 1827, the group was holding town meetings. In 1870, this form of government was severely tested when the common lands were divided in severalty and the Indians fully enfranchised. Apparently, the group was divided on these issues. When the tribal government was formalized as a New England town government in 1870, the group began to lose its political autonomy (Ibid.: 595-596).

As a town Gay Head had authority over its non-Indian residents and, moreover, was precluded from exerting authority over Indians who were non-residents and who did not own or share in the ownership of property in the town. By the 1930's a considerable number of Gay Head Indians were living elsewhere. Non-residents were precluded from voting in the town elections or town meetings. There is no evidence to indicate that an informal political system operated to give non-resident Indians a voice in the town's operations.

There is no evidence that the WTCGH formed in 1972 had its orgins in the town government, as the petition claims, nor any other organization of which there is a record. It did install in the ceremonial positions of chief and medicine man, the two men who had been active in these positions in earlier Indian organizations which became defunct (Vineyard Gazette 1972). The evidence suggests that the WTCGH exerts little influence over its 521 claimed members. In fact, there appears to be little participation of members who live in Gay Head. The present group's leaders are predominantly from one family. The founding group which is no longer active in council affairs, was also predominantly from one family. The level of participation in WTCGH affairs contrasts sharply with the interest the Indians display in the town government. The WTCGH is an organization without a substantial base of support in its claimed membership, either on- or off-Island.

LAND TENURE CONCEPTS

The history of land and land ownership concepts among the Gay Head Wampanoag is poorly recorded. Some of these concepts can be partially reconstructed by examining the reactions of the Gay Head Wampanoag to land transactions. It will be seen that some Indian concepts which existed earlier are still part of the Gay Head Indians' cultural inventory.

Martha's Vineyard was claimed in 1642 when young Thomas Mayhew took "possession of the island" (Banks 1966: I: 87). With possession of the land by the Mayhews, the English concepts of land and land ownership confronted those held by the Indians. The Indians did learn that non-Indians coveted the land and that they were not aware of the Indians' required consensual agreement before land rights could be transferred. Early title to the island was clouded, and the colonies of Maine, New York and Massachusetts claimed sovereign control (Banks 1966: I: 147-149). New York's Governor appointed Thomas Mayhew to Governor of the island for life in 1671 (Banks 1966: I: 147-149). In 1662, Wamsutta, a mainland Wampanoag sachem sold Gay Head to William Brenton, a Rhode Island merchant. What rights Wamsutta was transferring is unclear. What is clear, however, is that the Gay Head Wampanoag did not believe the right to possession was included. The sachem at Gay Head, Nohtoaksaet, refused to recognize this sale (Banks 1966: I: 7). In 1648, the Gay Head sachem, Joseph Mittark, a grandson of Nohtoaksaet, sold Nashowaquidsee to John Mayhew, a grandson of Thomas Mayhew (Mass. House 1856: 6-7). Nashawaquidsee or "Nashowa-aquiden-es-et" is a neck of land east of Gay Head, and situated between Menemsha Pond and Squibnocket Pond. A later sale of M'sque-puh-auk-et, the neck of land forming the south side of Squibnocket Pond, left the Gay Head Indians with the remaining lands which comprise the town today. There were no objections recorded to these two sales.

In May, Joseph Mittark sold Gay Head to Mathew Mayhew. The Indians protested this sale saying that Joseph's father, Mittark, wrote a covenant which said that the lands could not be sold. The covenant was subsequently declared a forgery by a commission of non-Indians, so the lands were regarded as having been legally transferred from Gay Head Wampanoag ownership. Mathew Mayhew leased the lands to the Indians. It is not clear whether he was leasing to individual Indians or to the tribe, since various problems developed which included the seizing of some of the Indian leases by non-Indians for non-payment of debts. Having become aware of the land problems of Gay Head, a missionary society known as the Corporation for the Propagation of the Gospel (i.e., the Company) purchased Gay Head in 1711. The Company feared the ruination of the Indians if they were turned off their lands.

The Company, however, was also facing economic difficulties and was in need of some additional funds. For this reason, it leased 600 acres of Gay Head land to Ebenezer Allen. Since this lease included some Indian houses (Banks 1966: II: 10-11), the Indians objected. When Mr. Allen renewed his lease with the Company 10 years later, he was given 400 additional acres. This irritated the Indians and they caused Mr. Allen considerable grief: they tore down his fences and impounded his cattle (GHWT 1983: I: 24). Finally in 1727 the Company, faced with these problems, deeded all but 800 acres back to the Indians. It is unknown how the Indians related to the 800 acres of non-Indian land in their midst.

As part of the transfer of lands to Indian ownership, the Indians agreed to be under the direction of the Company (Banks 1966: II: 11-12), but they were also wards of

Massachusetts. In 1746 Massachusetts appointed guardians for the Indians. The guardians were to "allot to the several Indians. . .such parts of said lands and meadows as shall be sufficient for their particular improvement. . .and the remainder. . .shall be let out. . .and income thereof. . .shall be applied for the support of such of the proprietors. . .as may be sick or unable to support themselves. . ." (Prov. of Mass. Bay 1746).

This non-Indian approach did not solve the land or economic problems at Gay Head. Between 1745 and 1767, the Indians sent 13 complaints to the colonial government to request help in alleviating the hardships created by the guardians. The division of Indian lands is shown on an April 25, 1776 map of Gay Head (Atlantic Neptune 1776). The lands, largely on the south side of Gay Head, are shown with defined boundaries and indicate the presence of at least 16 dwellings. The centrally located areas and the cranberry bogs on the northeast coast were not divided. The cliff area, on the other hand, has defined boundaries but no houses. These land divisions are largely long, narrow rectangular areas which are perpendicular to the coast. After the Revolutionary War, the tribe controlled the lands in Gay Head. How long the rectangular-shaped land allocations remained is not known. By 1858, many of the homes were centrally located in Gay Head. A map published that year shows the houses along with the names of the owners.

When Gay Head was made into a town and the common lands were divided in severalty in 1870, the new lots were rectangular much like those shown on the 1776 map. The boundaries of the Indian homesteads, on the other hand, which were required by law to be left intact, were more irregularly shaped.

According to Pease (1871: 21-22), Gay Head Wampanoag could sell their land only to other members of the tribe. Nonetheless, some Gay Head Wampanoag lands were sold as early as December 1793 by Zachariah Howwaswee to John Allen (Howwaswee 1793). This property was described as being in Gay Head and south of the dwelling of Jonathan Cuff. While Indian to non-Indian land transfers may not have been accepted culturally, they did take place. However, the records do not indicate that it was especially common. They do not show that some Gay Head Indians owned land in Chilmark outside Gay Head boundaries. Land held in severalty was passed, following unwritten rules, from generation to generation, but by 1849 a state investigative committee noted in their report that "At Gay Head, particularly, serious difficulties are already arising, which threaten the introduction of litigation. . .," and one of their recommendations was the ". . .importance of confirming the title of the proprietors of lands held in severalty, and of fixing the law of division and descent" (Mass. House 1849).

After the survey and division of most of the common lands by Pease and his surveyor, John H. Mullin, in 1870, the deed books reflect not only the Indians selling land to Indians, but also their selling land in Gay Head to non-Indians. For the latter this was at a rapid rate. The Dukes County Grantor Index (Dukes County 1859-1895) indicates that one Hariph M. Smith acquired at least 97 lots in Gay Head in 1879. Ephriam Mayhew acquired seven lots in 1885 and 1889, and Horatio N. Pease acquired nine lots, most recorded in 1882. In addition to these, transfers to other non-Indians would have resulted in 15 percent of all the lots in Gay Head being owned by non-Indians by 1895. The transfer of this much land to non-Indians was not of appreciable concern to the Indians at this time. There is no indication that there was any attempt on the part of the Indians to stop or slow this rapid process of their land passing into ownership of non-Indians.

Levitas' analysis of land transactions in Gay Head

> . . .indicates that by 1895 at least eighteen non-resident taxpayers owned land in Gay Head. Of these, ten were off-islanders and eight came from other island towns. From 1870 to 1895 one hundred and forty-seven land transactions are listed in the Dukes County Deed Books. Approximately forty-two percent represent local transactions —sales or gifts of land by one Gay Header to another. . .The remainder of the transactions represent sales to non-Indians. Over one hundred such sales are recorded—although the number of purchasers (eighteen) remained small (Levitas 1980: 352-3).

Since the division of the lands in the 1870's, the Indians have more fully accepted the white concept of land ownership, but even today they are much more tolerant of trespass and believe in the right of access for everyone. Levitas comments:

> In dividing the community up into lots the commissioners did not concern themselves with such matters as roads or access to roads. As a consequence, many lots actually had no acccess to the road—a problem that created no difficulties as long as owners did not bar access to abutting owners. Because of its corporate nature, the community lacked traditions prohibiting trespassing, and as a consequence Indian owners rarely attempted to get legal documents guaranteeing them rights of access when they sold land to non-residents . . .White residents, following their custom, sometimes denied Indians access to their own land—making their property worthless (Ibid.: 351).

While Levitas reports some conflict and resentment developing in the community over land sales and trades, only individual and personal issues were involved. The resentment was not community wide. It was not until recently that the groups which wanted to provide a land base for claims to Indian ethnic status became angry with those who, for economic or personal reasons, were selling land in the community to outsiders (Ibid.: 356). The Gay Head Indians today still believe in the freedom of access to property, which includes access to the land of others. The remainder of their land concepts reflect non-Indian values. As a basis to implement recent legislation for a land settlement in Gay Head, the WTCGH agreed that all zoning of the town of Gay Head would apply to some of the lands which would be transferred to them. They also agreed that "all laws, statutes and bylaws of the Commonwealth, the town of Gay Head, and any other properly constituted legal body, shall apply to all settlement lands and any other lands now or at any time in the future by the tribal council or any successor organization" (Mass. Acts 1985). The Indians would retain title to the land but would not pay taxes on it. In lieu of taxes, the WTCGH agreed to make payments to the town for any improvements on the property.

Summary

While the land in Gay Head was originally held in common, these common lands could be claimed by enclosure. These claimed lands, later called homesteads, could be passed to one's heirs or sold. While common land could be claimed, some was still shared in common. The right of access to all lands was an unwritten right.

When the common lands in 1870 were divided in severalty, the rights of access were still assumed. In the division, many of the parcels were land-locked. Without right of access, the division would have been unworkable. While memory deeds were prevalent prior to the land division, now land transfers are more likely to be legally recorded in the Duke's County Courthouse.

Today, except for the belief in freedom of access to land, the Gay Head Wampanoag share the same land concepts commonly held by the greater society. This is reflected in the WTCGH's acceptance of the terms of the agreement which led to the introduction of recent land settlement legislation in Congress.

SUMMARY

Historical documents indicate that since the 1600's, Gay Head Wampanoag Indians have occupied the western end of Martha's Vineyard, an island south of Cape Cod, in Dukes County, Massachusetts. Today this area is the town of Gay Head. There are only four major roads in town, and the dispersed, relatively isolated houses of the Gay Head Indians are connected to the major roads by drives and/or some lesser, older roads. Owing to this old road system, the houses of the Gay Head Indians have always been somewhat removed from those of their neighbors. When non-Indians moved to Gay Head and built their homes, they followed the same dispersed pattern. There is no business center for the inhabitants of Gay Head. The only commercial establishments in town are for tourists. There is a cluster of small souvenir shops and refreshment stands at the cliffs where the tourists view the multi-colored geological strata that give the town its name. The settlement pattern at Gay Head sharply contrasts with the dense and more compact settlements found in other Martha's Vineyard towns. These down-island towns have commercial centers serving both residents and tourists.

While Gay Head may have been more heavily populated in colonial times, by 1807, only 142 Indians were living there with 100 more reported as being absent. Presumably these absentees were the fisherman and/or domestics who lived and worked off-island. Since 1807 there has not been any large fluctuation in the resident Indian population. In 1910, 157 Indians were listed on the Indian census schedule taken by the Federal Government. This is only 15 more than in 1807. During the 1930's, the Indian population in Gay Head began a decline, first dropping from 129 in 1930 to 98 in 1940. By 1950 only 71 were living there. Today there are 78.

While the Indian population declined, the non-Indian population increased. In the 1970's, the Indians comprised 53 percent of the town's population but by 1980, they accounted for only 35 percent. It was during the 1970's that the Wampanoag Tribal Council of Gay Head was formed.

The Wampanoag Tribal Council of Gay Head, the petitioning group, lists 521 members who are the descendants of Indians on an 1871 list prepared when the town was incorporated and the common lands were divided. At the time of the division, only those who were members of the group were entitled to lands. While spouses are not included in the current list of members, some spouses at the time of the division received land. Rarely was a non-resident Gay Head Wampanoag entitled to share.

Communal activities were dominant throughout much of Gay Head Wampanoag history, but this began to change after the division of the common lands. Communal activities included plowing, grazing, fishing, and picking of cranberries in the fall. Technological changes in fishing such as power boats with mechanical winches required less manpower to haul the nets and place the stakes or spiles which hold the nets. The demise of cash farming has eliminated the need for cooperative agricultural endeavors. Such changes have promoted a more competitive economic environment.

The Gay Head Wampanoag had only one annual communal social event--Cranberry Day. Prior to the 1939 hurricane which severely damaged the bogs, the Indian community on a designated day would assemble to pick cranberries and socialize. The surplus cranberries were sold to assist the town's indigent. This celebration has now changed. The day now functions as an "Indian Heritage Day." During this event, Gay Head Wampanoag children, most of whom are bused in from down-island schools, are instructed in Gay

Head Wampanoag history. They are taken to the remaining bogs to pick some cranberries. In the evening, a meeting held in the town hall reinforces the Indian background for the adults. On display are Indian artifacts including recently made pottery from the clay at the cliffs and pictures of Gay Head, including some family photograph albums. The event is not well attended.

At the turn of the century, the town had institutions which reinforced social interaction and promoted social cohesion. There was a church, a post office and two grocery stores. The post office was closed in 1941 and today the town has rural mail delivery. The grocery stores closed in the 1930's forcing the inhabitants to shop in other towns. The church has declined in social importance. In the past when the church building needed repairs or painting, the church membership would provide the labor. Today the church is poorly attended and any repairs or painting are contracted out.

In aboriginal and early historical times, the Gay Head Wampanoag Indians were governed by a sachem and a council. When the position of sachem disappeared from the system in the 1680's, the group was governed by a council with consensual decision making. There were times when the Gay Head Wampanoag had guardians and overseers, but by 1827 they were holding town meetings and had chosen their own officers such as clerk and overseer of the poor.

Following the Civil War, the State passed legislation to enfranchise the Indians and to bring them into the greater society by dividing their common lands. This provoked controversy among the Gay Head Wampanoag. Some of the Indians favored the action but others opposed it. By 1870, the town system of government was in place but from that date to 1956, records of the town's activities are scarce since the town's records were destroyed by fire. From 1870 to the present, most of the town officials have been Indians but non-Indians have also held office. In 1910 for example, an unmarried, non-Indian held the position of town auditor.

The Wampanoag Tribal Council of Gay Head claims to be the tribal government of the Gay Head Wampanoag. Membership in the group requires proof of descendancy from the 1871 list of Indians who received lands at the time of the division of the common lands. While the office of the Wampanoag Tribal Council of Gay Head is Gay Head, only 78 of their members reside in the town. There are monthly and annual meetings, and a core of about 10, generally officers, are regularly in attendance. Most of those who attend are from Gay Head, but there are over 100 eligible voters in the nearby down-island towns such as Oak Bluffs and Vineyard Haven. At the last five annual meetings, only three members from Oak Bluffs and one from Vineyard Haven were present. Four members from off-island attended during this period. The low level of participation in Gay Head Wampanoag Tribal Council affairs suggests that the council has little support from its claimed membership.

By contrast, the Gay Head Wampanoags who live in Gay Head are involved in town issues. Voting records indicate that during town elections there is a considerable turn-out. In 1973, for example, there were 133 registered voters--Indian and non-Indian --and 103 voted. While Indian-related issues occasionally have been on the agenda for the town meetings, decisions do not follow ethnic lines.

Other indications that the town is not divided into Indian versus non-Indian are found in other political organizations. The Gay Head Taxpayers Association, when first formed in 1975, had both Indian and non-Indian members. In fact, some of the Indian members

were also founders of the Wampanoag Tribal Council of Gay Head. The principal concerns of the taxpayers organization at that time were focused on the town's financial procedures.

Belief in common accessibility to land is not shared equally between the Gay Head Wampanoag who live in Gay Head and their new neighbors. Prior to the 1870 division of the common lands, any member had the right to common land by enclosing or fencing the desired parcel, but the right of access would not be denied. Had this idea of the right of access not been widely shared by the Indians, the plat of the 1870 division of the common lands which created parcels without access to roads would have been unworkable. Today, with much of the land in town being owned by non-Indians, the issue of access creates some problems. Other than the accessibility issue, the Gay Head Wampanoag who reside in Gay Head share land concepts with the greater society.

In conclusion, there is no doubt that some Gay Head Wampanoag have lived in Gay Head since earliest historical contact. It is also clear that in colonial times they had a tribal organization which was governed by a chief or a sachem. By 1827, however, their government had evolved into an informal town system. This structure became formalized in 1870 when the Indians were enfranchised and their common lands were divided.

Prior to 1870, both the economy and technology of the Gay Head Wampanoags fostered a communal way of life. Cooperation was required in fishing, plowing and harvesting of cranberries. From 1870 to approximately the 1930's, communal activities slowly declined and with economic changes in farming and the technological changes, such as power-driven boats and winches in fishing, cooperative behavior disappeared. With the damage suffered by the cranberry bogs in the 1939 hurricane, their one communal social event ended.

With the demise of Cranberry Day and the lack of other institutions to promote social cohesion and to reinforce social interaction, the communal and cooperative way of life disappeared. Even other institutions such as the post office, grocery stores or other commercial establishments which could serve to promote social cohesion were no longer is existence. The only institutions which persisted as integrative mechanisms were the town and town government, and the latter served the entire community-both Indian and non-Indian.

Today, the Gay Head Wampanoag descendants are found largely on Martha's Vineyard and in southeastern Massachusetts. That 15 percent living in Gay Head are part of the town of Gay Head. The Wampanoag Tribal Council of Gay Head is not a tribal organization. It is an Indian descendancy group based in Gay Head. As a descendancy organization, its members share in their pride of Indian ancestors who once lived in Gay Head.

GENEALOGICAL REPORT ON THE GAY HEAD WAMPANOAGS

I. SUMMARY

The Gay Head Wampanoags are located in the Town of Gay Head, Massachusetts, on the island of Martha's Vineyard. Since the time of English colonization of the island in the mid-1600's, Gay Head has been recognized as a community of Indians or Indian descendants. Although a small number of the group's membership actually reside at Gay Head, the majority reside within easy commuting distance.

The present governing body of the Gay Head Wampanoags is of recent creation. It has set formal governing procedures and the criterion for membership in the group. However, the membership roll is an informal compilation. Families known to be of Gay Head Indian descent which could meet the membership criterion were automatically placed on the roll. In the few cases when the group did not personally know the family, documentation was requested in order for the group to investigate whether the families qualified under the criterion for membership.

The criterion for membership is descent from a Gay Head Wampanoag who appears on the 1871 census of Gay Head. No attempt has been made by the group to trace the ancestry of the group's membership any further back than to this census although the group is aware of which historical Gay Head Indian families are ancestral to the current families. There is documentary evidence to establish the ancestry of the group's membership back to Gay Head Indians who appear on a list prepared in 1792. Evidence to connect the group's 1871 ancestors with the Gay Head Indians of 1792 was found in the personal notes of Richard L. Pease who was appointed by the Commonwealth of Massachusetts in 1866 to determine the boundaries of severalty-owned and common lands at Gay Head. Supporting evidence was found in the land records of Dukes County, Massachusetts, vital records of the state and towns of Massachusetts as well as in published materials. This evidence also suggests that several of the 1792 ancestors were descendants of the aboriginal inhabitants of the area at the time of English colonization.

There are no full blood Gay Head Wampanoags. The Gay Head Indians have always recognized the fact that they were of mixed ancestry but have always maintained their Indian identity. The marriage patterns of the Gay Head Indians from the late eighteenth century to the twentieth century reveal that the majority of non-Indian ancestry resulted from marriages with other Indians who were mixed bloods. The majority of marriages in this century have been with non-Indians coinciding with the diminishing number of other Indian residents on Martha's Vineyard and the movement of some of the members off Gay Head.

Although the present membership does have Indian ancestry other than Gay Head Wampanoag, none of the ancestry would make them eligible for membership in any federally recognized Indian tribe. In recent generations there have been

a few instances where the group's members have married members of federally recognized tribes. Descendants of these unions have not been enrolled as members of the petitioning group.

No evidence has been found indicating that the Gay Head Wampanoags ever had a relationship with the Federal government. The Gay Head Wampanoags do not appear on the Bureau of Indian Affair's official list of "Indian Tribes Terminated from Federal Supervision." No legislation is known to exist which terminates or forbids a Federal relationship with this group or its members.

There were significant changes in the composition of the group in the nineteenth century. The report will discuss the apparent change in the historical criteria for membership as well as the disappearance of surnames of Indian origin that had been associated with Gay Head in the previous century. These changes in the nineteenth century do not negate the conclusion that the Gay Head Wampanoags are the present-day descendants of the historical and aboriginal group that inhabited Gay Head, Massachusetts.

II. GOVERNING BODY

The governing body of the Gay Head Wampanoags is the Wampanoag Tribal Council of Gay Head organized on October 28, 1972 and incorporated under the laws of the Commonwealth of Massachusetts on January 10, 1973 (WTCGH 1972; 1973c). The governing document of the Tribal Council is a set of by-laws adopted by unanimous vote at a general meeting of the Tribal Council on February 12, 1977 (Ibid. 1977a; 1977b). The set of by-laws is a revision of by-laws adopted on January 6, 1973 (Ibid. 1973a; 1973b). A general meeting of the membership is held annually and special meetings of the membership are called periodically. A quorum for a general meeting is fifteen members including the officers.

Monthly meetings are held by the Board of Directors of the Tribal Council which includes the President, Vice-President, Secretary, Treasurer and seven directors. The officers are elected for a two-year term. Three of the directors are elected for one-year terms, two are elected for two-year terms and two are elected for three-year terms. Also serving on the Board of Directors are a Chief, a Medicine Man and an honorary director who hold these positions for life. The Chief and the Medicine Man are holdovers from a previous council and consented to serve on the Board of Directors at the organizational meeting of the Tribal Council (Ibid. 1972).

III. MEMBERSHIP CRITERIA

The criterion for membership is lineal descent from a Gay Head Wampanoag who appears in the 1871 "Census of Inhabitants of Gay Head." This census was published as Appendix B in Richard L. Pease's Report of the Commissioner Appointed to Complete the Examination and Determination of All Questions of Title to Land, and of All Boundary Lines Between the Individual Owners, at Gay Head, on the Island of Martha's Vineyard (Pease 1871). This criterion is

set forth in the by-laws of the group:

> The basis for membership is to be the 1870 census roll. Any person directly descended from a Gay Head Wampanoag on this roll automatically is eligible for life long membership in the Wampanoag Tribal Council of Gay Head, Inc. (WTCGH 1977b).

The criterion was reaffirmed by a general meeting of the membership held on March 3, 1980. However, the wording of the motion is confusing. The motion reads

> That any Wampanoag tracing his or her ancestry back to the 1870 census of Gay Head, with that ancestor being recognized as a Gay Head Wampanoag Indian, shall qualify as a member of the Wampanoag Tribe of Gay Head for the purposes of Federal Rcgnition [sic] (Ibid. 1980).

Because the motion refers to the "Wampanoag Tribe of Gay Head," it is not clear whether this organization is identical to that represented by the Wampanoag Tribal Council of Gay Head. A statement made by the President of the Tribal Council at the same meeting implies a difference:

> ... the difference between Tribal and Tribal Council membership. Tribal council membership is voluntary and Tribal membership comes from the direct family line extending from the 1870 census (Ibid.).

BAR requested clarification of the meaning of the above statement. Members of the Board of Directors including the Tribal Council President who made the statement state that there is no difference between Tribal and Tribal Council membership. The statement was intended to mean that participation in the Tribal Council is voluntary.

Blood Degree

The Tribal Council has considered limiting its membership by using a blood degree requirement. A motion adopting such a requirement was passed in 1979. However, the motion has never been enacted. The current Board of Directors does not consider this motion as being properly adopted, and considers that the only requirement for membership is lineal descent from a Gay Head Wampanoag on the 1871 census.

The 1979 motion passed at a Tribal Council meeting at which an attorney from Native American Rights Fund was present reads

> members of the Gay Head Wampanoag Tribe be 1/8th proven Gay Head Wampanoag blood given that members of the 1869/70 census and base roll are full-blooded (Ibid. 1979a).

In response to BAR's request for clarification regarding the blood degree motion, the Tribal Council President replied

> 1/8 blood quantum was never voted by a meeting of the regular membership of the tribe called for that purpose. Although discussed frequently and included in many discussions of the tribe and leadership ... the March 3, 1980 meeting is regarded as the official position of the tribe regarding the membership issue (Widdiss 1985).

The March 3, 1980 meeting referred to is the meeting where the membership reaffirmed the membership criterion of lineal descent from a Gay Head Wampanoag on the 1871 census.

IV. GROUP'S MEMBERSHIP

For acknowledgment purposes the membership consists of 521 members as of June 1, 1985. Two lists identifying the members of the group have been submitted as part of the petition. The first list, dated May 1, 1983, contained 496 members. No addresses were provided for any of the members. A request from BAR for addresses resulted in a second list dated June 1, 1985, which contained the names of 530 members. The second list contained 41 additional names. Six names that had appeared on the 1983 list were omitted. However, the omission of two of the names was an oversight, and the Tribal Council President stated that the two individuals should be considered as members. Because ten of the members appearing on both lists and one of the additional names on the 1985 list are noted as deceased, BAR concluded that there are 521 living members at the date of the 1985 list.

Analysis of Current Membership

Genealogical information concerning the majority of the members who appear on the 1983 roll was submitted on charts suggested in the Acknowledgment guidelines as the type to use for gathering the genealogical information needed to process a petition for Federal acknowledgment. The charts were prepared by one of the members who had been appointed "Genealogist" for the group. Further information requested by BAR was submitted by the Tribal Council President. In order to determine how the members traced back to the 1871 census, BAR staff prepared fifteen descendancy charts beginning with an an ancestor who appears in the 1871 census.

The membership criterion specifically states that the ancestor on the 1871 census must be a Gay Head Wampanoag. However, the census does not clearly distinguish between Gay Head Wampanoags, other Indians, and non-Indians. The Tribal Council Board of Directors could not explain how they determine who is and who is not a Gay Head Wampanoag on the census. They maintain that they just "know," and if they are not sure they would "investigate."

To evaluate whether the members meet the group's own membership requirement, BAR interpreted a Gay Head Wampanoag in the 1871 census as one who

> (a) was designated as Gay Head in the column "Tribe or Race" in the 1861 list of Indians prepared for the Governor and Council of Massachusetts under the Act of April 6, 1859 (Earle 1861);
>
> and
>
> (b) had at least one parent born at Gay Head according to Pease (Pease 1871).

At least one ancestor listed on each of the 15 descendancy charts meets (a) and (b).

Of the 521 members, 513 (98% of the total membership) meet the group's membership criterion, i.e., that they descend from a Gay Head Wampanoag who appears on the 1871 census. There was insufficient information to determine whether two of the members met the group's membership criterion. Six members (1% of the total membership) were found not to be descendants of anyone on the 1871 census, and therefore, do not meet the group's membership criterion.

Depending upon their ages, members are as close as one generation or as far as five generations from the Gay Head Wampanoag ancestor on the 1871 census. The majority of the members appear to be three and four generations from the Gay Head Wampanoag ancestor. Intermarriage between families in the first and second generations occurred to such a degree that a majority of the members have at least two and probably three lines of descent back to someone on the 1871 census.

A geographical analysis of members addresses shows that over a third of the group's membership reside on the island of Martha's Vineyard and that almost three-quarters of the membership reside in Massachusetts within easy commuting distance from Gay Head.

Geographical Distribution of GHW Membership (Total: 521)

		# of members	%(rounded)
Massachusetts		385	74%
Total on Martha's Vineyard	215 (41%)		
Gay Head	78 (15%)		
Martha's Vineyard (excluding Gay Head)	137 (26%)		
Elsewhere in Massachusetts	179 (33%)		
Other than Massachusetts		110	21%
Addresses unknown		26	5%

Included in the documented petition were copies of the Town Clerk's Reports from the Annual Town Reports of Gay Head, newspaper obituaries, Federal population census schedules, and records of the Gay Head Baptist Church. All these records were utilized to document selected lines of descent from the 1871 ancestor to the current member. The Town Clerk's Reports included the births, marriages and deaths reported to the Town Clerk in the particular year. Sixty out of 84 reports published from 1896 to 1980 were submitted. The Federal population census schedules are for the Town of Gay Head for the years 1870 (the first year Gay Head appears in the Federal census), 1880, 1900 and 1910 (the last census open to public inspection). The 1890 Federal population census was almost completely destroyed in a fire. The newspaper obituaries were clippings from a local Martha's Vineyard newspaper. All three sources provided evidence of family relationship. The church records basically provided death dates and evidence of marriage.

Field research was also undertaken to obtain further evidence to document selected lines. Research was done in the land and probate records of Dukes County (Martha's Vineyard), Massachusetts, the state copies of Massachusetts town and city vital records, Federal census records at the National Archives, and the collections at the libraries of the Dukes County Historical Society, the Daughters of the American Revolution, the New England Historic Genealogical Society and the Library of Congress.

The selected lines that were documented are representative of the 15 family lines charted on BAR's descendancy charts. Included in these selected lines are all past and present Tribal Council Presidents. The total number of members whose ancestry was documented is 134. This is about one-quarter of the total membership (26%). Because virtually all of the remaining members are closely related to those documented selected lines, BAR concludes that the membership virtually consists of individuals who not only meet the group's membership criteria but can easily document their ancestry back to the 1871 ancestor.

Former Lists

As required by the acknowledgment regulations, seven former lists of members were submitted. All the lists were compiled in the 1970's or early 1980's although one of the lists is not dated.

Two of the former lists were compiled in 1979 for the purpose of submitting a proposed list to all the members so they could add the names of individuals not presently on the roll who would be eligible (WTCGH 1979c; 1979d). The first list which was prepared by the Tribal Roll Committee Chairman identifies 290 members. The second list prepared by a volunteer identifies 371 members. One name on the second list did not appear in the 1983 membership roll submitted with the petition but did appear as one of the additions to the 1985 roll. There are several names on the two lists that do not appear in either roll submitted as part of the petition. It was determined that these members were deceased by May 1983.

An 1978 list divides the membership by residence - Gay Head (86), Martha's Vineyard except Gay Head (148 but includes one with an off-island address and

several spouses of members), and off-island (134). The total number of members identified on this list is 368. The undated list is an address list identifing 371 members.

A copy of a demographic area profile sheet for Coalition of Eastern Native Americans done in 1974 was submitted. The profile sheet contained 234 names (the total given on the sheet incorrectly states 236). Also submitted were two lists of adult members. The first list, dated 1975, was prepared for the election of the Sachem of the Wampanoag Nation. This list included 234 names. The second list, dated 1981, was apparently prepared for the voting on the land settlement and contained the names of 287 members.

All the former lists contain essentially the same family lines. The additional members that do not appear on any of the former lists but do appear in the 1983 and 1985 membership rolls submitted for acknowledgment include families related to the families who appear on the former lists as well as children of individuals on the former lists.

Historical Lists

The group submitted with the petition two lists of Gay Head Indians prepared in the nineteenth century by commissioners appointed by the Commonwealth of Massachusetts to examine and report the condition and circumstances of the Indians living within Massachusetts. The first list, prepared about 1848, was submitted as part of the report published in 1849 (Mass. House 1849). The second list, prepared about 1858-59, was submitted as part of the report published in 1861 (Earle 1861). The two lists were utilized in determining the ancestry of the group's 1871 ancestors discussed later in this report. A copy of the 1871 census, the list used for the group's membership criterion, was also submitted.

Compilation of the Roll

The Tribal Council compiled the membership roll by contacting those families they knew to be eligible and requesting information on their immediate families. The Tribal Council also requested from these families addresses for their relatives who lived out of state in order that the Tribal Council could contact them. The relatives living out of state were then contacted for information on their immediate families and requested to provide the names of others who should be put on the roll. It is the opinion of the current Board of Directors that the 1985 roll plus the two members who were inadvertantly omitted constitute the membership of the Gay Head Wampanoags. They believe that they had "pretty well contacted everybody."

There are no formal procedures for admission to membership nor are there any enrollment forms. The original by-laws of the Wampanoag Tribal Council of Gay Head, Inc., provided for a membership committee which would accept all applicants to be listed on the roll (WTCGH 1973b). The current by-laws do not mention a membership committee; however, Tribal Council minutes after the adoption of the revised by-laws do occasionally refer to a Tribal Roll Committee. The Tribal Council knows the ancestry of most of its members and therefore apparently felt there was no need for enrollment forms or to

require evidence to show that the member met the membership criterion. There have been a few instances where the Tribal Council was unsure whether the individual or family was descended from a Gay Head Wampanoag on the 1871 census. In these cases the Tribal Council requested documentation from the individual or family in order that the Tribal Council could investigate whether they did descend from a Gay Head Wampanoag on the 1871 census. Two families added to the 1985 roll required such an investigation. The file on one of the families was shown to the BAR genealogist. In the file were birth and marriage certificates documenting the family's ancestry to the ancestor on the 1871 census.

Active work on the membership roll began in the spring of 1973. At the March 24 meeting of the Tribal Council, a recommendation was made to have a membership drive to establish how many people belong to the "Wampanoag Council of Gay Head." It was further recommended that all members should make a head count of their individual families. The following meeting in April was conducted as a workshop on the membership list with each member assigned the task of identifying as many names in the Gay Head families as possible.

In 1974 the membership committee (also referred to as the "Census Committee") reported that

> We are including all people from that time [the 1871 census] through the 4th generation to go on our tribal roles[sic]. After the fourth generation, the degree of Indian blood lessens, according to whether or not one marries an Indian or a non-Indian. It was decided that in no instance should the degree of Indian blood be less than one-eight in order for that individual to be eligible for tribal benefits (Ibid. 1974).

As discussed above under membership criteria, the Tribal Council did pass a motion in 1979 requiring a blood degree of one-eighth given that the Gay Head Wampanoag ancestor on the 1871 census is considered full blood. However, this motion was never utilized and the present Board of Directors does not consider the motion as being properly adopted.

It was decided at the meeting of June 2, 1979 that the current incomplete roll should be typed and sent to all the members so they could submit names of individuals not presently on the roll who would be eligible for membership (Ibid. 1979c). Copies of two lists prepared for this purpose were submitted with the petition.

A form letter was sent to the members in 1980 requesting information on each family in order to complete the genealogical portion of the Acknowledgment petition. The letter also requested that the member include "any Gay Head Wampanoag people who may not be on the Tribal Roll and have had no contact with the Tribal Council or Gay Head" and provide any information that would assist the Tribal Council in contacting them (Widdiss 1980). A second form letter, dated 1982, was sent requesting that the member review the information the Tribal Council had collected on his or her family noting any additional information that should be included and the names of any family members that were not listed (Malonson 1982).

Consent

It is not known how many of the members on the 1985 roll are actually aware that their names appear on the roll. Because there is no formal enrollment form, there is no record of the members' consent to being placed on the roll. The 1982 letter stated

> If, for whatever reason, you do not wish to be included as a member of the Wampanoag Tribe of Gay Head in the Federal Recognition process, please notify the Tribal Council in writing stating your wishes. If no notification to the effect is received, we will automatically include your name on the membership roll. If your children are over eighteen years of age, they must write their own requests (Ibid.).

No evidence was presented to show how many letters were sent, who received the letters, and whether anybody made any formal response.

At a meeting with some of the dissident faction those in attendance indicated that they had no problems being listed on the membership roll but disavowed any association with the Tribal Council.

V. HISTORICAL CRITERIA FOR MEMBERSHIP

Prior to the incorporation of Gay Head as a town in 1870, the Gay Head Indians were considered a distinct Indian group by the Commonwealth of Massachusetts. Group membership included the priviledge to appropriate for his own use as much unimproved common land that the member desired. This land could be enclosed and passed on to his heirs (Mass. House 1849:20). The land could be sold to other members of the group, but it could not be sold outside the group (Earle 1861:38).

The term used to describe a group member was "proprietor." This term was borrowed from the English colonists who used the term to describe those who owned shares with others of undivided land granted by the colony. A description of those who were entitled to tribal priviledges at Gay Head was made in 1807:

> Every native, whether he lives off or on the island, is considered as a proprietor; and every child born to him is entitled to a right, which is equivalent to the pasture of three sheep (Freeman 1971:51).

If the definition of a proprietor was correct at that time, it changed significantly in the next forty years. By 1850 not all Gay Head Indians were automatically entitled to become proprietors. However, non-Gay Head Indians and certain non-Indians were being admitted as proprietors.

The report issued in 1861 concerning the number and condition of the Indians in Massachusetts contains a description of those who were entitled to the privilege of being a proprietor. A non-Gay Head Indian could be automatically admitted as a proprietor if he married a Gay Head Indian and settled in Gay Head. With the consent of the Gay Head Indians, a non-Indian

who married a Gay Head Indian and was permanently residing at Gay Head could become a proprietor. However, not all non-Indians were granted this privilege. According to the 1861 report, the Gay Head Indians

> are very cautious in the concession of this right, as they are jealous of the influence of foreigners [i.e., non-Indians], having had much trouble with some of these who have intermarried with their women and settled amongst them (Earle 1861:32).

In 1849 seventeen proprietors of Gay Head signed a petition. Four of the proprietors were non-Gay Head Indians, one a foreign national, and one a non-Indian (Mass. House 1849:87-88). The petition indicates that non-Gay Head Indians and non-Indians were being admitted as proprietors by 1849. That not all non-Indians were being admitted as proprietors is substantiated by a deed dated that same year. In the deed, a non-Indian resident of Gay Head described himself as a non-proprietor while his wife is called a proprietor (Salsbury 1849). This non-Indian had been a resident of Gay Head since 1808 when he married a Gay Head Indian. Although a resident of Gay Head for forty-one years, he had never been accorded the priviledge of proprietorship.

The act which incorporated Gay Head into a District in 1862 described the group as "the Indians and people of color constituting the Gay Head tribe of Indians." The provision regarding who would have the right to vote incorporated what had been reported in 1861 regarding tribal membership. Besides natives of Gay Head, those eligible to vote were Indians from other tribes in Massachusetts who were married to Gay Head women. Any other person whose permanent residence was at Gay Head and who was married to a Gay Head woman "shall have the right conferred on him by two-thirds of the voters of the district" (Mass. Acts 1862).

Besides admitting non-Gay Head Indians and non-Indians as tribal members, the other change in tribal membership was the exclusion of those who were Gay Head Indians but not residents of Gay Head. Apparently residency became an important factor in deciding who would become a proprietor. In 1849 the proprietors were complaining about the children and grandchildren of Gay Head Indians who removed off island coming back to Gay Head and claiming full group rights (Mass. House 1849:87 88). In the 1861 report are two lists of Gay Head Indians. The first list contained 204 individuals who were recognized as members of the tribe. The second list, titled "Supplementary List," contained the names of 46 individuals, all off island residents, who claimed to belong to the tribe but were not recognized as tribal members by those at Gay Head (Earle 1861).

Gay Head Indians who were not recognized as group members did share in the act which provided for the defining of the boundaries of land owned in severalty at Gay Head. However, these Gay Head Indians only received their share of the land as heirs of a deceased proprietor--not as proprietors in their own right. When the common land of Gay Head was divided in the 1870's, only those female Gay Head Indians who lived off Gay Head but still on Martha's Vineyard received any land. One Gay Head Indian who appeared in the 1861 Supplementary List was not added to those entitled to receive common land until he had demonstrated that he intended to make Gay Head his

permanent residence even though he was married to a Gay Head Indian who was already on the list (Pease n.d.).

Division of Common Lands

The 1863 and 1866 Acts provided for the confirmation of the titles and boundaries of severalty-owned land. The act incorporating Gay Head into a town provided for the division of common land at Gay Head if consented to by the majority of residents (Mass. Acts 1870). On December 5, 1870, the Probate Judge of Dukes County having received such assent appointed two commissioners to divide the common land and allot the land to the residents (Mayhew 1870).

One of the commissioners was Richard L. Pease. He had previously been appointed to succeed Charles Marston as the commissioner to confirm the titles and boundaries of severalty-owned land. His report regarding the earlier commission was published in 1871. In the appendix to this report is the census used by the Gay Head Wampanoags for their membership criterion. Referring to this census in his report, Pease stated that it "will be of great service in the work, yet to be performed, of dividing the common land" (Pease 1871:25).

Although Pease implies that his enumeration contained those whom he could identify as "Gay Head Indians," a study of this census, a later census submitted with the report concerning the division and allotment of common land, and the actual records of allotments show that he actually compiled his list based on the definition the Gay Head Indians used for tribal members as reported in 1861. Six of the 227 names listed in his 1871 census were not residents of Gay Head. Two resided at Chappaquiddick on Martha's Vineyard and four resided in towns on the Massachusetts mainland. In the actual allotment of common lands, the two who resided at Chappaquiddick did receive common land, but the four living on the Massachusetts mainland were omitted from the allotment. Thirty out of the 227 listed on the census did not share in the allotment of common lands. Fourteen were deceased by 1878, and 15 were found not to be residents of Gay Head (Pease n.d.).

The actual list of those who did share in the allotment of common land is found in the Dukes County Probate Records, volume 59, and in the Dukes County Land Records, volume 65. The list is also entitled "census of inhabitants of Gay Head" and is part of the report regarding the division and allotment of common lands filed at the Dukes County Registry of Probate. This census incorporates both individuals listed in the 1871 census as well as those who were determined to be heirs of severalty-owned land under the Acts of 1863 and 1866. These heirs were for the most part children and grandchildren of Gay Head proprietors who were living permanently off-island. They did not share in the allotment of common land.

Included in the list of those who did share in the allotment of common land were 29 additions to the 1871 census who were assigned census numbers 228 to 256. Twenty-one of the additions were children born between June 1871 and June 1877 to those on the 1871 census. Three of the additions were spouses of those on the 1871 census married after the census was compiled. Two of the spouses were non-Indians. The third spouse was of Gay Head ancestry who

was added to the list after he demonstrated to Pease that he intended to make Gay Head his permanent residence. Five other additions were all adult females of Gay Head ancestry residing elsewhere on Martha's Vineyard.

VI. GAY HEAD ANCESTRY

Notwithstanding the change in composition of tribal members in the nineteenth century to include non-Gay Head Indians and non-Indians, evidence indicates that the members of the Gay Head Wampanoags are the lineal descendants of the aboriginal tribe. The ancestry of the 513 members whose descent can be demonstrated from a Gay Head Wampanoag on the 1871 census was traced through the 1871 Gay Head Wampanoag ancestor back to the 1792 list of Gay Head Indians. Although the ancestry of the 1792 Gay Head ancestor was not traced, evidence suggests that these ancestors were the descendants of the aboriginal inhabitants of the area at the time of English colonization.

Although there was in existence in the early 1900's a manuscript containing the genealogies of the Indian families of Martha's Vineyard, this manuscript could not be located (Banks 1966:III, v). The personal notes of Richard L. Pease when he was commissioned to determine the titles and boundaries of severalty-owned land at Gay Head were used as the basis for establishing the ancestry of the 1871 Gay Head Wampanoag ancestor back to 1792. Supporting evidence was found in the land records of Dukes County, Massachusetts and local vital records as well as in published materials.

The 1792 list, prepared by a Gay Head Indian, is the earliest complete list located of the proprietors of Gay Head. The list gives the name of each proprietor, the degree of Indian blood, and the number of persons in the proprietor's household (Howwaswee 1792). Only one line was traced in the ancestry of the 1871 Gay Head Wampanoag ancestor. The majority of the membership will have more than one line that can be traced to 1792 due to intermarriage among the families. As an example, those members who trace back to John Occouch will also trace back to Thomas Cooper because their 1871 Gay Head Wampanoag ancestor married a descendant of Thomas Cooper.

The following table shows the breakdown in numbers and percentages (rounded) of the 513 members out of the total of 521 members who can trace back to the 1792 list.

Breakdown of the 513 members who trace to the 1792 list

1792 ancestor and degree of Indian blood	No. of Descendants	% of 513 members
Talknot heirs	192	37%
Thomas Cooper (1/2)	185	36%
John Occouch (full blood)	57	11%
Isaiah Howwaswee (full blood)	35	7%
Mercy Talman, wife of Isaac Johnson, a stranger, (15/16)	32	6%
Israel Amos (7/8)	11	2%

Of the 513 members, 320 (62%) can trace back to one of the proprietors on the list. One of the lines traced descends from Mercy Johnson, the second wife of John Occouch (Henry 1843; Morse 1843). However, it can not be ascertained whether Mercy Johnson, who was a Gay Head Indian, was married to John Occouch at the time the 1792 list was compiled. She is the ancestor of the one member of the 513 members not accounted for in the table given above.

In the above table, the "Talknot heirs" are the descendants of Margaret Talknot. The only Talknot (Tauknet, Tocknet, Tockquenett) on the 1792 list is Isaac Tockquenett, a full-blood Indian, with nine persons living in his household. He may be the male progenitor of the "Talknot heirs." However, there is a marriage record for Elisha Tauknet to Margaret Johnson in 1768 (Woods 1904:74). It is possible that Elisha was the direct male progenitor and Isaac a collateral ancestor who was designated the head of the Talknot household in 1792. One hundred sixteen of the members who are classified as descendants of the "Talknot heirs" also have a Howwaswee line. However, their Howwaswee line could not be traced back with any certainty to 1792.

Of the ancestors listed in the above table, BAR estimates that over half of the current membership in the Gay Head Wampanoags descends from Thomas Cooper. Thomas Cooper, born about 1732, was the source for the legend of Moshup, a mythical Gay Head demi-god, published by Bassett in 1792. Cooper claimed that his grandmother was "a stout girl, when the English came to the island" (Bassett 1792: 139). There is a tradition that his wife, Mary Herrie or Harry, was a descendant of the Sachem Mittark (Vanderhoop 1904). The line of descent from Mittark to Mary (Herrie/Harry) Cooper as given can not be verified; there appears to be a generation missing in the lineage. This couple had twelve children, and although the male line of this family died out about two decades ago, there are many who descend from female lines.

The Occouch and Howwaswee families were two of the oldest families of Gay Head. Both families were prominent in the affairs of the Gay Head

Congregational Church. Members of the Occouch family appear to be the descendants of Akoochuk (d. 1714) who married a daughter of Mittark (Mayhew 1727:102). In the eighteenth century the surname was spelt Akoochuck and Orkoochuch but was eventually modified to Occouch or Accouch.

Howwaswee is probably a variation of the surname Ossoit or Hosuwit. A Gay Head Indian named Zachariah Osooit was living in the last decade of the seventeenth century (Mayhew 1727:197). A later Zachariah Osooit/Oswait was the pastor at Gay Head (CPG 1729-87). The Zachariah Oswait, Jr., pastor at Chappaquiddick in 1771, is probably identical to the Zachariah Howwaswee who was pastor at Gay Head in 1792. The marriage record of the daughter of Rev. Zachariah Howwaswee in 1805 shows her surname as Horswet (Woods 1904:56). Moses Howwaswee, the compiler of the 1792 list, signed his name on 1785 petition as Moses Hoswisit.

Ninety-eight percent of the 521 members of the Gay Head Wampanoags are the descendants of the historical tribe as it existed in 1792. Over half of the membership (53%) can trace to one of three ancestors (Cooper, Howwaswee, or Occouch) who apparently descend from the aboriginal inhabitants of Gay Head at the time of English colonization. No effort was made to determine whether the other 1792 ancestors descend from the aboriginal inhabitants of Gay Head. However, because membership in the tribe was hereditary at this time, these ancestors should trace back to the aboriginal tribe.

VII. MARRIAGE PATTERNS

The blood degrees given for the Gay Head Indians in the 1792 list show that over half of the Gay Head Indians were of varying degrees of mixed blood. In the preface to his 1792 list, Moses Howwaswee stated "we very much mixd on s'd Gayhead, but very few clear Indian families on S'd Gayhead" (Howwaswee 1792). In an 1811 petition, the group described themselves:

> ...there are no more than forty Gayhead Indians of full age which are considered as haveing no other than Indian blood and allowing all the said petitioners to be Indians there are more than a hundred Indians of Gayhead of full age and a greater number of Infants all of which descended from the aboriginals (Mass. Acts 1811).

Notwithstanding the diminishing number of full-blood Indians at Gay Head and the admittance of non-Gay Head Indians and non-Indians as proprietors, there was still a strong sense of Indian identity among the group which they did not want to lose. One of the reasons given for opposition to incorporating Gay Head as a town was "we shall soon lose our identity as Indians" (Jeffers, et al. 1869).

The introduction of non-Indian blood among the Gay Head Indians caused doubts among outsiders as to whether to classify them as Indians. This is evident in the Federal population census schedules. The first Federal census in which Gay Head appears is the 1870 census. Both the 1870 and 1880 censuses were taken by non-Indians who were not residents of Gay Head. In the 1870 census all the Indian families were classified as Black even though the choices for color included Indian (Bureau of the Census 1870: 703-704R). The

1880 census enumerator appeared to classify those members of the old historic Gay Head families as Indian although he was not consistent in that siblings were not all classified as Indians. The rest of the families were classified as Mulattoes (Ibid. 1880:532-533R).

The 1900 census and the 1910 census were taken by Gay Head Indians. All the Gay Head families are classified as Indian in both schedules (Ibid. 1900:204A-205B; 1910:213A-216B). In the 1910 census, the Gay Head families are enumerated on the special Indian schedules. With the exception of two individuals who were non-Indian spouses, all were assigned to the Pockonocket (i.e., Wampanoag) Tribe. The special Indian schedule also included proportions of blood degrees for each individual. Many have a high proportion of Indian blood recorded, but it can not be ascertained how this blood proportion was calculated. In at least one instance where all four of the grandparents were known for an individual, the actual degree of Indian blood was much lower than reported on the 1910 schedule. There does appear to be at least one individual who was a half-blood Indian and was so classified in the 1910 schedule.

How much non-Indian blood was introduced directly by intermarriage between Gay Head Indians and non-Indians before 1792 is not known. Studying the marriage patterns of the Gay Head Indians from the late eighteenth century to 1871 reveals that probably much of the non-Indian blood introduced into the Gay Head population resulted from intermarriage with mixed-blood Indians from other tribal groups. The largest percentage of marriages outside Gay Head in the period from about 1800 to 1871 were with members of other Wampanoag tribal groups - particularly those groups on Martha's Vineyard. As the population of the other island tribal groups diminished in the last half of the nineteenth century, so did the number of intermarriages among these groups and the Gay Head Indians. As a result of this intermarriage, the remnants of those other tribal groups still living on the island have more Gay Head ancestry than any other Indian ancestry and are enrolled as members of the Gay Head Wampanoags.

The actual number of marriages between Gay Head Indians and non-Indians in the period between 1800 and 1871 only accounted for approximately a quarter of the total marriages in this period. About half of the non-Indian spouses were foreign born. The percentage of marriages with non-Indians did not substantially increase until the twentieth century. Among the current group, the majority of marriages are with non-Indians. There have been a significant number of marriages with the Portuguese-American community in southeastern Massachusetts in current times. Historically Portuguese nationals have provided about half of the non-Indian spouses.

The apparent cause of the introduction of non-Indian blood among the Gay Head Indians was the lack of male Gay Head Indians for marriage partners. From the 1790's to the mid-nineteenth century there appears to be a disproportionate number of females among the Gay Head Indians. There were 57 females compared to 27 males listed as heads of household in 1792 (Howwaswee 1792). In examining the marriage records and intentions of marriage recorded in the Town of Chilmark, Massachusetts, from 1790 to 1849, 71 females could be identified as Gay Head or probable Gay Head while only 35 males could be so identified (Woods 1904). The most dramatic example of the decreasing native male population in this period is that of the 59 surnames of Indian

origins that appeared in 1792 list, only Occouch and Howwaswee appear in the 1849 list. The Occouch family had already died out in the male line by 1849 and the only Occouches listed are females (Mass. House 1849). Only one male Howwaswee was living in 1849 (Ibid.). He was the last male Howwaswee and he died in 1873 without issue (Howwoswee 1874).

One reason for the diminishing native male population was that most native males found employment as mariners. Many did not return (Earle 1861: 34). As a result, female Gay Head Indians had to look elsewhere for marriage partners. Because the largest percentage of marriages were to other Indians in the period from about 1800 to 1871, the female Gay Head Indians apparently sought marriage partners from those groups first.

Ante 1800 Marriage Patterns

In 1792 there are listed 15 "Strangers," i.e., not native Gay Head Indians, as head of households (Howwaswee 1792). These strangers had married Gay Head Indians and, as the following table shows, the majority of the strangers were mixed blood Indians.

Non-Gay Head Indian spouses listed in 1792 (Total: 15)

	No.	%
Full blood Indians	4	27%
Mixed blood Indians	9	60%
Non-Indian	1	7%
Foreigner	1	7%

Of the 15 strangers only 4 are known to have left descendants living at Gay Head in 1849. All four were mixed blood Indians. Three of them married (probably) full blood Gay Head Indians. Thomas Francis, originally from Rochester, Massachusetts, married a "Horsuet" in 1772 (Scott 1914:II,184). Jonathan Cuff (a.k.a. Slocum), originally from Dartmouth, Massachusetts, married an Occouch in 1772 (Scott 1929-30:II,450). Henry Dodge, origins unknown, also married an Occouch (Pease n.d.). Isaac Johnson, whose origins are also unknown, married a Talman who was 1/16th white (Talman 1805; Howwaswee 1792).

By the end of the nineteenth century the descendants of Francis, Cuff and Dodge living at Gay Head had died out in the male line. There are descendants of Isaac Johnson with the surname Johnson on the current membership roll of the Gay Head Wampanoags. This is the only surname from the 1792 list that is still extant among the current membership of the Gay Head Wampanoags.

1800-1871 Marriage Patterns

A study was made of the marriage patterns of the Gay Head Indians who appear on the 1849 list and on the 1871 census. In determining whether a spouse was Indian or non-Indian, use was made of the 1861 list of Gay Head Indians which shows the tribe or race of each individual (Earle 1861). Further research was conducted with Pease's notes pertaining to the titles and boundaries of severalty-owned land, vital records and Federal population census schedules in determining Indian or non-Indian origins. Two individuals were identified

as Indian in 1861, but this identification could not be substantiated in other sources. On the contary, other evidence indicated they were non-Indians and were so classified in the table presented below. In compiling the following tables all known spouses of the Gay Head Indians who were in the 1849 and 1871 lists were taken into account. This included spouses deceased or divorced from by 1849 and 1871. There is an overlap in the two tables because Gay Head Indians living in 1849 appear in the 1871 list.

Marriage patterns of Gay Head Indians listed in 1849 (Total: 44)

Marriages between Gay Head Indians	15	34%
Marriages with other Indians	13	30%
Marriages with non-Indians*	7	16%
Marriages with Foreigners*	5	11%
Spouses whose origins undetermined	4	9%

Marriage patterns of Gay Head Indians listed in 1871 (Total: 66)

Marriages between Gay Head Indians	27	41%
Marriages with other Indians	18	27%
Marriages with non-Indians*	9	14%
Marriages with Foreigners*	7	11%
Spouses whose origins undetermined	5	8%

Post 1871 Marriage Patterns

Marriage patterns of the Gay Head Indians began to change in the twentieth century. Fifteen descendancy charts were drawn up by BAR for the purposes of determining how the current membership descends from a Gay Head Wampanoag on the 1871 census. Using these charts a tabulation was made of 58 marriages that took place from about 1871 to about 1930.

Marriage patterns of Gay Head Indians who appear on BAR's descendancy charts from about 1871 to about 1930 (Total: 58)

Marriages between Gay Head Indians	30	52%
Marriages with other Indians	4	7%
Marriages with non-Indians*	22	38%
Marriages with Foreigners*	0	0%
Spouses whose origins undetermined	2	3%

*The term non-Indian is used to describe those born in the United States who have no Indian ancestry. The term Foreigner is used to denote those who were born outside the United States. Briggs (1849) and Earle (1861) use the term foreigner for both native born and foreign born non-Indians.

Two important changes in the marriage patterns of the Gay Head Indians took place in this time period. The first change is a substantial decrease in the number of marriages with other Indians. This decrease coincides with the decrease of non-Gay Head Indians residing on Martha's Vineyard. The second change is the increase in marriages with non-Indians. Marriages with non-Indians since 1930 have increased to such an extent that they account for almost all marriages since 1930. This increase coincides with the movement of many of the Gay Head Indians to other Martha's Vineyard towns and to the Massachusetts mainland.

Non-Gay Head Indian Spouses

The 1849 tabulation of marriage patterns shows that the second largest percentage of marriages were to other Indians. Of these 13 marriages, 8 (62%) of the 13 marriages were to Indians from other Wampanoag tribal groups on Martha's Vineyard. There were four groups in existence on the island around 1800. The two largest groups were the Chappaquiddick Indians and the Christiantown Indians. Two smaller groups of Indians lived in Edgartown at Farm Neck and in West Tisbury at Deep Bottom. Only one Farm Neck Indian (whose mother was a Gay Head Indian) is found among the marriages tabulated in 1849. This group apparently became extinct in the early nineteenth century since they do not appear in the 1861 list of Massachusetts Indians. No intermarriage is found among the Deep Bottom Indians in the 1849 tabulation. This group existed in 1861 and consisted of five families with a total of thirteen people (Earle 1861).

The Chappaquiddick Indians provided several male spouses introducing surnames that have been historically associated with Gay Head since the nineteenth century. Many of the current members of the Gay Head Wampanoags are descendants of Johnson Peters, a mixed-blood Chappaquiddick Indian, who married a Cooper. His daughters married their cousins, a Madison and a Belain, introducing those two Chappaquiddick names at Gay Head (Pease n.d.). All three surnames, Peters, Madison and Belain, appear in the current membership roll of the Gay Head Wampanoags.

At Christiantown in 1861 there were only 53 people enumerated as Christiantown Indians. They were either of the DeGrasse, Peters or James families. The DeGrasses descended from a Gay Head Indian who married a Christiantown Indian and settled at Christiantown. His stepson, William Jeffers, married a Gay Head Indian and settled at Gay Head founding a second family of Jeffers at Gay Head (Pease n.d.). Members of the James family were the descendants of a non-Indian, Thomas James, who married a Christiantown Indian, Judith Weeks. Of their six children, four married Gay Head Indians. Eventually one of their sons settled at Gay Head and his descendants are enrolled as members of the petitioning group.

By the early twentieth century the number of Chappaquiddick and Christiantown Indians still resident on tribal lands had diminished to a total of three families. At Chappaquiddick only two Indian families were left by the 1920's (Jeffers ca. 1973). Because of intermarriage with the Gay Head Indians over the generations, both families have more Gay Head ancestry than Chappaquiddick. The present day descendants are all on the Gay Head Wampanoag membership roll.

The last Christiantown Indians living at Christiantown were the Mingo family, descendants of the Christiantown Peters family (Banks 1966: II, Annals of West Tisbury, p. 133). The sole descendant of this family whose mother was a Gay Head Indian) married a Gay Head Indian and lived at Gay Head until her death in 1967. She died without issue.

Although there are two instances of marriage with non-Wampanoag Indians in the nineteenth century, the majority of intermarriage with Indians other than those on Martha's Vineyard were with Wampanoag tribal groups residing along the coast of southeastern Massachusetts. The majority of these marriages were with the Mashpee Indians.

Mashpee families which intermarried with the Gay Head Indians included the Attaquin, Pocknet and Jeffers families. The surnames of Attaquin and Jeffers are found on the current membership roll of the Gay Head Wampanoags. The male line of Pocknets on Gay Head adopted the surname of Francis about 1900. The Jeffers are the descendants of Thomas Jeffers, the Baptist preacher, who settled at Gay Head in 1798. He was a Wampanoag Indian from Plymouth, Massachusetts who married a Mashpee Indian. Their son was assigned to the Mashpee Indians in the 1861 list of Gay Head Indians. All current members of the Gay Head Wampanoags who are descendants of Thomas Jeffers descend through this son who married a Cooper.

There is little evidence of intermarriage in the more recent generations of Gay Head Indians with the coastal Indian groups living in southeastern Massachusetts. There are reports that members have married into Indian tribes in Maine, Utah and California. However, these are very few in number (probably about five). Children from those marriages between Gay Head Indians and members of federally recognized tribes are not on the Gay Head Wampanoag membership roll. Apparently the Tribal Council believes that those children will be enrolled in their non-Gay Head Indian parent's tribe.

Non-Indian Spouses

There have been marriages between Gay Head Indians and non-Indians since the eighteenth century. The majority of non-Indians who married Gay Head Indians before the twentieth century were seamen. According to the 1861 report, these seamen became acquainted with Gay Head men at sea, came to Gay Head and married Gay Head women (Earle 1861:34). Such non-Indian surnames as Divine, Manning and Salsbury that appear in Gay Head in the first decade of the nineteenth century were probably introduced this way.

In four of the marriages with non-Indians and foreigners tabulated for 1849, both parties were residents of New Bedford, Massachusetts at the time of their marriage intentions (Howes 1932-41). All four Gay Head Indians were females and probably employed as domestics in New Bedford. Once married, three of the couples settled in Gay Head. The fourth couple remained in New Bedford although they are listed in the 1849 list of Gay Head Indians (in 1861 they appear on the supplemental list). Three of these marriages were with foreigners. Two of the men were from Surinam, including the male progenitor of the Vanderhoop family which is today the largest single family on the Gay Head Wampanoag rolls.

Of the two non-Indians appearing as heads of household in the 1792 list, one was a Portuguese national from the Cape Verde Islands. He apparently came to Martha's Vineyard in 1775 as a hired sailor. About 1778 he married a mixed blood Gay Head Indian and settled at Gay Head (Pease 1820). This is the first known instance of intermarriage with the Portuguese nationals from the Azores, Cape Verde and Maderia islands. The men from these islands signed on to fill out crews in American whaling vessels. They landed and settled in such whaling ports as New Bedford and Edgartown, Massachusetts. In the decades from 1870 to 1930 immigration from these islands greatly increased and the majority of the immigrants settled in already established Portuguese communities particularly in southeastern Massachusetts (Thernstrom 1980:814). As the Gay Head Indians moved into communities in southeastern Massachusetts in the twentieth century, there was considerable intermarriage with the Portuguese-Americans as evidenced by the surnames Andrada, Araujo, Cecilio, DeBettencourt, Gonsalves, Monterio, Moreis, etc., which appear in the descendancy charts of the members.

VIII. FEDERAL RELATIONSHIP

The Gay Head Wampanoags do not appear on the Bureau's official list of "Indian Tribes Terminated from Federal Supervision" (Simmons 1985). No legislation is known to exist which terminates or forbids a Federal relationship with the group. In the first decade of the twentieth century, individual Gay Head Indians were admitted to Carlisle Indian Industrial School. However, these Gay Head Indians were admitted based on their Indian ancestry and not because the Gay Head Indians were federally recognized.

The Gay Head Indians were recognized by the Commonwealth of Massachusetts as an Indian tribe until 1870 when Gay Head was incorporated as a town. In July of 1976, the Governor of Massachusetts signed an executive order recognizing the Gay Head Indians as a tribe and the "Tribal Council of Gay Head Wampanoag Indians" as its governing body (Grapevine 1976a). State recognition has no effect on the Federal acknowledgment process.

SOURCE MATERIALS

Published Works

Anonymous
1932 The Alden Almanack and Handbook for Cape Cod, Old Colony, and the Islands. Boston: Alden Hauk, Inc.

Attaquin, Helen
1970 A Brief History of Gay Head; or "Aquinuih". By Author.

Banks, Charles Edward
1966 The History of Martha's Vineyard. 3 vols. Edgartown, MA: Dukes County Historical Society. Reprint of 1911-1925 edition.

Barber, John Warner
1839 Massachusetts Historical Collections, Being a General Collection of Interesting Facts, Traditions, Biographical Sketches, Anecdotes, Etc., Relating to the History and Antiquities of Every Town in Massachusetts with Geographical Descriptions. Worcester: Dorr, Howland & Co.

Bassett, Benjamin
1792 Fabulous Traditions and Customs of the Indians of Martha's Vineyard. Massachusetts Historical Society Collections. Series 1, 1:139-40.

Boston Suburban Book Co.
1907 Martha's Vineyard Directory. Boston, MA.

Duffield, Lathel
1983 American World View and the Concept of Status. Pp. 3-15 in Southeastern Natives and their Pasts. Don G. Wyckoff and Jack L. Hofman. Oklahoma Archeological Survey. Norman, OK.

Dumanoski, Dianne
1975 Battling to Regain A Lost Past: Martha's Vineyard Indians Want Their Land Back. The Boston Phoenix, IV:34, August 26.

Eaton, Walter Pritchard
1923 Martha's Vineyard: A Pleasant Island in A Summer Sea. New York: The New York, New Haven, and Hartford Railroad Co., and the New England Steamship Co.

Federal Writer's Project
1937 Massachusetts: A Guide to Its Places and People. American Guide Series. Boston: Houghton Mifflin Co.

Freeman, James
1971 A Description of Duke's County, August 13, 1807. Originally published in 1815. The Dukes County Intelligencer, 12:51, May.

Goell, Blanche I.
1925 Tramping on Martha's Vineyard: A Talk Originally Given Before the Appalachian Mountain Club of Boston. Edgartown: Dukes County Historical Publications I (December).

Hare, Lloyd C.M.
1932 Thomas Mayhew: Patriarch to the Indian (1593-1682). New York: D. Appleton and Co.

Hertzberg, Hazel W.
1971 The Search For An American Indian Identity: Modern Pan-Indian Movements. Syracuse: Syracuse University Press.

Hine, C.G.
1908 The Story of Martha's Vineyard. New York: Hine Brothers.

Hodge, Frederick Webb, ed.
1971 Handbook of American Indians North of Mexico. Reprint of Smithsonian Institution, Bureau of American Ethnology, Bulletin 30. In Two Parts. New York: Rowman and Littlefield.

Hohman, Elmo P.
1972 The American Whaleman: A Study of Life and Labor in the Whaling Industry. Reprint of 1928 edition. Clifton, N.J.: Augustus M. Kelley Publishers.

Hough, Henry Beetle
1975 Mostly on Martha's Vineyard: A Personal Record. New York: Harcourt Brace Jovanovich.

Hough, Henry Beetle and Alfred Eisenstaedt
1970 Martha's Vineyard. New York: Viking Press.

Howes, Florence Conant, ed.
1932-41 Vital Records of New Bedford, Massachusetts to the Year 1850. 3 vols. Boston: The New England Historic Genealogical Society.

Kellaway, William
1961 The New England Company, 1649-1776: Missionary to the American Indians. New York: Barnes and Noble.

Marten, Catherine
1970 The Wampanoags in the Seventeenth Century: An Ethnohistorical Study. Occasional Papers in Old Colony Studies, 2:3-40.

Martha's Vineyard Chamber of Commerce
1930 Martha's Vineyard, Massachusetts: The Isle of Wealth. New Bedford: Reynolds Printing.

Mayhew, Ebenezer
1727 Indian Converts or, Some Account of the Lives and Dying Speeches of a Considerable Number of the Christianized Indians of Martha's Vineyard, in New-England. London: printed for Samuel Gerrish.

Mayhew, Eleanor Ransom, ed.
1956 Martha's Vineyard: A Short History by Various Hands. Edgartown, MA: Dukes County Historical Society.

Norton, Henry Franklin
1923 Martha's Vineyard: The Study of Its Towns. Hartford, CT: The Pyne Printery.

Railton, Arthur R.
1982a Gay Head Light: The Islands First. The Dukes County Intelligencer, 23:91-116.

1982b Gay Head Gets the Wondrous Fresnel. The Dukes County Intelligencer, 23:139-71.

Ritchie, William A.
1969 The Archaeology of Martha's Vineyard: A Framework For the Prehistory of Southern New England; A Study in Coastal Ecology and Adaptation. Garden City, N.Y.: Natural History Press.

Salwen, Bert
1978 Indians of Southern New England and Long Island: Early Period. In Northeast. Bruce G. Trigger, vol. ed. Pp. 160-176. Volume 15 of Handbook of North American Indians. William C. Sturtevant, gen. ed. Washington: Smithsonian Institution.

Scaglion, Richard
1974 The Moshop Tale: A Chronological Analysis of a Wampanoag Indian Myth. The Dukes County Intelligencer, 16:19-26.

1977 The Martha's Vineyard Wampanoag: A Political and Demographic Overview with Historical and Cultural Bibliography. The Dukes County Intelligencer, 19:44-56.

Scott, Henry Edwards, ed.
1914 Vital Records of Rochester, Massachusetts to the Year 1850. 2 vols. Boston: The New England Historic Genealogical Society.

1929-30 Vital Records of Dartmouth, Massachusetts to the Year 1850. 3 vols. Boston: The New England Historic Genealogical Society.

Shaler, N.S.
1874 Martha's Vineyard. Atlantic Monthly, 34:732-740, December.

Simmons, William S.
1976 Southern New England Shamanism: An Ethnographic Reconstruction. In Papers of the Seventh Algonquian Conference. William Cowan, ed. Pp. 217-256. Ottawa: Carleton University.

Smith, John
1912 The Generalle History of Virginia, New England, and the Southern Isles. The Sixth Booke: The Generalle History of New England. Reprint of 1624 edition. Pp. 650-673 in Vol. 2 of Forerunners and Competitors of the Pilgrims and Puritans. Charles Levermore, ed. 2 vols. Brooklyn, N.Y.: The New England Society of Brooklyn.

Tantaquidgeon, Gladys
1930 Notes on the Gay Head Indians of Massachusetts. Indian Notes. Museum of the American Indian. Heye Foundation, New York. VII:1:1-26, January.

Thernstrom, Stephan, ed.
1980 Harvard Encyclopedia of American Ethnic Groups. Cambridge, MA & London, England: The Belknap Press of Harvard University Press.

Vaughan, Alden T.
1965 New England Frontier: Puritans and Indians, 1620-1675. Boston: Little, Brown and Co.

Vickers, Daniel
1985 Nantucket Whalemen in the Deep-Sea Fishery: The Changing Anatomy of an Early American Labor Force. The Journal of American History, 72:277-296, September.

Vineyard Associates Publicity Bureau
n.d. Martha's Vineyard (Nature's Show Window). Edgartown, MA.

Winslow, Edward
1910 Winslow's Relation [1624]. Pp. 267-357 in Chronicles of the Pilgrim Fathers. John Masefield, ed. New York: E.P. Dutton.

Woods, Henry Ernest, ed.
1904 Vital Records of Chilmark, Massachusetts to the Year 1850. Boston: The New England Historic Genealogical Society.

Woodson, C.G.
1920 The Relations of Negroes and Indians in Massachusetts. Journal of Negro History, 5:45-57.

Newspapers

Allen, Joseph Chase
1968 Gay Head Voters Approve Purchase of Police Vehicle. Vineyard Gazette. March 15.

Bamberger, Michael F.
1983a Meeting Yields No Progress in Gay Head Suit. Vineyard Gazette. June 14.

1983b Land Disputes Stir Reaction in Gay Head. Vineyard Gazette. August 23.

1983c Meeting Asks Gay Head Pact. Vineyard Gazette. August 30.

1983d Accord Seen in Gay Head. Vineyard Gazette. September 2.

1983e Tribe Plans A Settlement Vote. Vineyard Gazette. September 13.

1983f Gay Head Holds Critical Vote on Land Settlement Saturday. Vineyard Gazette. November 18.

1983g Gay Head Pact Makes History. Vineyard Gazette. November 25.

1984a Plan on Indian Claim Introduced in House. Boston Globe. April 22.

1984b Governor Dukakis Hears Arguments In Gay Head Case. Vineyard Gazette. May 11.

Boston Globe. Boston, MA.
1984 U.S. Supreme Court Shows Vineyard Indian Claim. May 22.

Breslauer, Mary
1977 Reservation Plan Surfaces to Trouble Gay Head Talks. Vineyard Gazette. August 12.

1979 Indian Hatchery Plan Abandoned. Vineyard Gazette. April 13.

Cabral, Douglas
1977 Wampanoags Will Move to Add Additional Land in Gay Head. Vineyard Gazette. May 27.

Cooper, Kenneth

1983 Gay Head Tribal Land Pact Given One OK, But Still Faces Obstacles. Boston Globe. November 8.

Fleury, Rick
1984a Tribe to Hire Health Service. Vineyard Gazette. October 2.

1984b Health Survey Announced for Island Indians. Vineyard Gazette. November 30.

Grapevine. Vineyard Haven, MA.
1973a July 4.

1973b July 18.

1973c August 22.

1975a March 5.

1975b April 16.

1976a March 31.

1976b May 19.

1976c July 14.

James, Frank
1979 Letter to Editors. Vineyard Gazette. March 2.

Jeffers, Lorenzo D.
1967 Letter to Editors. Vineyard Gazette. July 7.

Loveridge, G.Y.
1947 King Philip's Tribe. The Rhode Islander Magazine of the Providence Sunday Journal. November 16.

Malonson, Donald, Luther Madison and Gladys A. Widdiss.
1983 Letter to Editors. Vineyard Gazette. August 12.

Meras, Phyllis
1970a Mrs. Weissberg Wins Gay Head Selectman's Race. Vineyard Gazette. March 13.

1970b Gay Head Votes For Year-Round Police Officer. Vineyard Gazette. April 10.

New Bedford Standard Times. New Bedford, MA.
1934 August 5.

1935 February 28.

1967 May 20.

1976 February 2.

Pollan, Michael
1973 Taxpayers Organize. Vineyard Gazette. July 24.

Reston, Richard
1977a Governor to Name Harvard Dean Mediator in Gay Head. Vineyard Gazette. June 28.

1977b Mediation Effort in Gay Head Dispute Will Begin Next Week. Vineyard Gazette. July 8.

Reston Richard
1978a Indians, Gay Head Taxpayers Disagree on Status of Talks. Vineyard Gazette. May 5.

1978b Indians, Taxpayers Verge on Accord; Details of Pact Disclosed. Vineyard Gazette. November 17.

1979 Wampanoag - Taxpayers Talks Once Hopeful, Near Collapse. Vineyard Gazette. April 13.

Vandal, Wenonah
1959 Protest Meeting of Disgruntled Taxpayers. Vineyard Gazette. August 21.

Vanderhoop, Mary A. Cleggett
1904 The Gay Head Indians: Their History and Traditions. The New Bedford Evening Standard. June 25.

Vineyard Gazette. Edgartown, MA.
1891 February 6.

1931 March 6.

1932 August 23.

1933 Col. Goethals Pays Tribute to Gay Head at Public Unveiling. August 29.

1934 March 9.

1936 March 6.

1937 Gay Head Would See Shore Road Built. February 26.

1941a Gay Head Census Shows Big Drop in Population. October 20.

1941b Indian Legends Will Be Presented At Devil's Den. August 12.

1948 Moshup's Twelve Lovely Daughters Were No Doubt Precursors of These Half Dozen Talented Sisters. July 16.

1951a Whale Oil Days At Gay Head Are Recalled As The Town Basks in White Light of Electricity. February 16.

1951b Souvenir History of the Gay Head Pageant. August 31.

1952 Fifth Gay Head Pageant Attracts 800 to Cliffs. August 19.

1955a Momentous Action Taken by Gay Head. March 11.

1955b Pageant Will Further Gay Head Harbor Hope. June 24.

1956a Gay Head Revives "Two Party" Setup. March 16.

Vineyard Gazette. Edgartown, MA.

1956b Gay Head to Petition For Building Code. May 18.

1957 Gay Head Spends A Leisurely Five Hours on Warrant. March 15.

1958a Vinelanders to Attend Powwow At Mashpee. August 22.

1958b Gay Head Approves Bond Issue of $21,500. December 5.

1959a L.D. Jeffers Heads the Wampanoag Descendants. February 6.

1959b Selectmen Look Askance at Bill Filed For Jeffers. February 20.

1959c Jeffers Sets Critics Right. February 27.

1959d Town Harbor Project on Gay Head Warrant. March 6.

1959e Harmony Reigns At Gay Head Meeting. March 13.

1959f Tax Assessment System Rescinded, Action Questioned. September 11.

1960 Gay Head Will Consider An 18-Article Warrant. March 4.

1963a Gay Headers Vote Money to Develop Shellfishery. March 15.

1963b Hearing is Scheduled At Gay Head Hall. June 21.

1963c Gay Headers Say They Will Brook No Meddling. June 28.

1966a Gay Head Adopts New By-Law Code At Annual Meeting. March 11.

1966b Aims Are Defined. July 16.

1966c Board Asks County to Construct Rest Rooms. September 16.

1967 Gay Head Leaves School Future to Decision by Board. March 17.

1968 Gay Head is Stirred to Wrath by Publicity. March 1.

1971a Gay Head Deals With Multiplicity of Difficulties. March 12.

1971b Gay Headers Agree to Charge For Cards. June 14.

1972a November 10.

1972b December 8.

1973a March 16.

1973b Town Dollar Spending Is To Be Watched By New Group. July 10.

1973c Gay Head Taxpayers Act to Study Town Records. August 31.

Vineyard Gazette. Edgartown, MA
1974 August 13.

1975 February 28.

1976 June 15.

1977a Tribal Council Wins New Grant. May 6.

1977b Indian Talks Progress Eyed. October 7.

1981a A Tribal Faction Asks to Intervene. September 11.

1981b The Land Suit Began in 1974. September 29.

1982 Judge's Dismissal Moves Gay Heads Nearer to Accord. December 24.

1983a The Sunshines Elsewhere But A Cloud Hangs Over Gay Head Taxpayers Association. August 5.

1983b Dissident Indians Win An Injunction. November 4.

1983c Indians Address State Legislature. December 23.

1985 Surveys of Tribe Proceeding Well. February 1.

White, Joseph B.
1980 Wampanoag Land Suit Talks Said to Be At New Impasse. Vineyard Gazette. December 19.

1981a Indian Suit Talks Pushed by Town's Trial Threatened. Vineyard Gazette. April 3.

1981b Town Beach Issue Stymies Gay Head Suit Negotiation. Vineyard Gazette. July 21.

1981c Suit Standoff in Gay Head. Vineyard Gazette. August.

1981d Politics Get Heated As Tribal Claim Settlement Vote Nears. Vineyard Gazette. September 22.

1981e Indian Land Claim Struggle Comes Down To Tribal Vote. Vineyard Gazette. September 25.

1981f Gay Head Tribal Council Approves Plan to Settle Land Claim Suit. Vineyard Gazette. September 29.

1981g Indian Land Claims Hit Seven Towns; Suits Divide Wampanoag Community. Vineyard Gazette. December 25.

West, Dorothy
1966 Gay Head Revealed. Vineyard Gazette. December 9.

Unpublished Materials

Allen, Ebenezer
1724 Counterpart of Lease to Land on Gay Head Neck. October 16. Papers of the Corporation For The Propagation of the Gospel. Box 3, Folder 3. New England Historic Genealogical Society, Boston, MA.

Clap, Elisha
1808 Letter to Jedidiah Morse. July 22. Miscellaneous Bound Collections. Massachusetts Historical Society, Boston, MA.

Corporation For the Propagation of the Gospel (cited as CPG in text)
1727 Settlement of Land of the Gay Head Indians. May 10. Corporation Papers, Box 3, Folder 5. New England Historic Genealogical Society, Boston, MA.

1729-87 Commissioner's Book For Propagating the Gospel in New England. Corporation Papers, Box I. New England Historical Genealogical Society, Boston, MA.

1739 Minutes of the Commissioner's Meeting in Boston. March 17. Corporation Papers, Box 2. New England Historical Genealogical Society, Boston, MA.

Grabowski, Christine
1982 Gay Head in the Twentieth Century: Town and Tribe, Town vs. Tribe. Prepared For and Under the Direction of the Wampanoag Tribal Council of Gay Head.

Hahn, Robert C.
1985a Letter to Donald P. Hodel. BAR Files. June 27.

1985b Letter to Donald P. Hodel. BAR Files. October 1.

Howwaswee, Moses
1792 Account of Indians Resident At Gay Head. March 19. Miscellaneous Collections. Massachusetts Historical Society, Boston, MA.

Hutchins, Francis G.
1986 A Short History of Gay Head, Massachusetts From 1642 to 1985. Prepared for Hale and Dorr, Counsellors At Law, Boston and Washington.

Jeffers, Milton
ca. 1973 Oral History Transcript. The Dukes County Historical Society, Edgartown, MA.

Levitas, Gloria
1980 No Boundary Is A Boundary: Conflict And Change in A New England Community. Ph.D dissertation, Rutgers, the State University of New Jersey.

Locklear, Arlinda
1983 Letter to John A. Shapard, Jr. BAR Files. October 12.

Malonson, Donald, Luther Madison, and Gladys A. Widdiss
1985 Letter to Branch of Federal Acknowlegment, BIA. BAR Files. May 15.

Mayhew, Matthew, Ephraim Mayhew, and Stephen Litton
1803 Letter to Edward Pope, Superintendent to the Lighthouse at Gay Head. August 13. Collections of the Dukes County Historical Society, Edgartown, MA.

Pease, Richard L.
n.d. Indian Genealogy - Chappaquiddick, Gay Head. [Original notes of Pease taken when he was commissioner under Mass. Acts of 1866 and 1870.] Box 125B, Envelope 17. The Dukes County Historical Society, Edgartown, MA.

Skiff, Ebenezer
1823 Letter to the Rev. Frederick Baylies. February 3. Miscelleous Bound Collections. Massachusetts Historical Society, Boston, MA.

Skiff, Ellis
1840 Letter to John P. Newton. March 4. Manuscript Collection. Dukes County Historical Society, Edgartown, MA.

Society For the Propagation of The Gospel (cited as SPG in text)
1798 A List of the Children under Eighteen Years of Age, the 14th Day of May 1798 At Gay Head, Dukes County. Miscellaneous Collections. Massachusetts Historical Society, Boston, MA.

Tantaquidgeon, Gladys
1934 The New England Indians. Unpublished Report Submitted to the Commissioner of Indian Affairs. December 6. In GHWT 1985.

Vanderhoop, Leonard F.
1973 Oral History Transcript. March 26. The Dukes County Historical Society. Edgartown, MA.

Federal, State and County Records

Browne, John N.
1838 Report of the Committee to whom was referred the Petition of Howwaswee and Others, Indians of Gay Head, regarding the sale of ardent spirits. In the legislative papers accompanying the Massachusetts Acts of 1838. Chapter 101. Massachusetts State Archives. March 6.

Carlisle Indian Industrial School.
1905-1918 Descriptive and historical record of students. NARA. RG 75. Records of the Bureau of Indian Affairs.

Clafin, William
1869 Address of the Governor to the General Court. Massachusetts Acts and Resolves: 843-844. January 9.

Commonwealth of Massachusetts. Acts.
1785 Resolve authorizing and appointing guardians for Indians at Gay Head. Chapter 4:627-28.

1811 An Act for the better regulation of the Indian, Mulatto, and Negro Proprietors of Gay Head, in the County of Dukes County. Chapter 78.

1813 An Act in addition to an Act, for the better regulation of the Indian, Mulatto, and Negro proprietors of Gay Head, in the County of Dukes County. Chapter 66.

1828 An Act for the better regulation, instruction, and government of the Indian and people of colour in the County of Dukes County. Chapter 64. March 10.

1835 Resolve in aid of common schools among the Indians in Dukes County. Chapter 100:143. April 7.

1838 An Act prohibiting the sale of ardent spirits to Gay Head Indians. Chapter 101. April 10.

1839 Resolve on the Petition of Zaccheus How-was-wee and others. Indians and people of color of Gay Head. Chapter 75. April 9.

1856 An Act to establish and confirm the boundary line between the town of Chilmark and the Indians of Gay Head. Chapter 204. May 28.

1862 An Act concerning the Indians of the Commonwealth. Chapter 184. April 30.

1863 A Resolve appointing the treasurer of the district of Mashpee to determine the boundaries between the individual owners of land in the Indian district of Gay Head. Chapter 42. March 30.

1864 An Act extending the applicability of the Act of 1864, Ch. 305, concerning the protection of domestic animals to the district of Gay Head. Chapter 305. May 14.

Commonwealth of Massachusetts. Acts.

1866 Resolves in relation to the establishment of boundary lines of Indian lands at Gay Head. Chapter 67. April 30.

1869a An Act granting citizenship to all Indians in the Commonwealth. Chapter 463:780-783. June 23.

1869b Resolve in relation to the Gay Head Indians. Chapter 103:824. June 23.

1870 An Act to incorporate the town of Gay Head. Chapter 213:140-142. April 30.

1884 Resolve in favor of certain inhabitants of Gay Head and Chilmark. Chapter 41:380. April 17.

1891 Resolve providing for repairs on a certain schoolhouse in the town of Gay Head. Chapter 41:1070. April 1.

1921 An Act to protect fish in certain waters of Menemsha Pond in the town of Gay Head. Chapter 25. February 16.

1928 An Act authorizing the town of Gay Head to borrow money for the purpose of acquiring land for and constructing a town hall. Chapter 11. February 2.

1923 An Act prohibiting during certain months the use of beam or other trawls in taking fish from certain waters of the Towns of Chilmark, Gay Head and Gosnold. Chapter 35. February 20.

1985 An Act to implement the settlement of Gay Head Indian Land Claims. Chapter 277.

Commonwealth of Massachusetts. House of Representatives.

1827 H.R. Document No. 68 (Indians of Dukes County).

1849 Report of the Commissioner's relating to the conditions of the Indians. House Report No. 46. February 21.

1856 Gay Head and Town of Chilmark. House Report No. 48. February.

1867a An Order that the Committee of towns inquire into the conditions of the Indian of the Commonwealth . . . . Journal of the Massachusetts House of Representatives. P. 42. January 17.

1867b An Order that the Board of State Charities be directed to inquire into the conditions of the Indians of the Commonwealth . . . . Journal of the Massachusetts House of Representatives. P. 464. May 31.

1868 An Act that a special committee be appointed . . . who shall inquire and examine into the conditions, wants, and rights of the Indian tribes of the Commonwealth . . . . Journal of the Massachusetts House of Representatives. P. 59. January 25.

Commonwealth of Massachusetts. House of Representatives

1869 Indians of the Commonwealth. House Document No. 4843:1-17. June 3.

1884 Order Re: Gay Head Indians - City of Columbus disaster. Journal of the Massachusetts House of Representatives. P. 103. January 29.

1891 Reports of the Committee on Education on the petition of Thomas Jeffers, Sr., and others for an appropriation of $100 for repairing the Gay Head School House. In papers accompanying the Massachusetts Acts and Resolves of 1891. Chapter 41. Massachusetts State Archives. February 19.

1917 Special Report of the Commissioner on Waterways and Public Lands Relative to Acquiring Land in the Town of Gay Head for a State Reservation.

1921 Bill accompanying the petition of Lorenzo D. Jeffers and others relative to fishing in the waters of Menemsha Pond in the town of Gay Head. House No. 14.

1923 A bill accompanying the petition of A.L. Rodman and others that the use of beam and otter trawls in certain waters of the towns of Chilmark, Gay Head and Gosnold be restricted. House No. 251.

1928 A bill accompanying the petition of the Selectmen that the town of Gay Head be authorized to borrow money for the purpose of acquiring land and constructing a town hall. House No. 439.

1953a A bill accompanying the petition of Edmund S. Cooper and another (Selectman) for prohibiting dragging, gill netting, and seining in certain waters along the north shore of the town of Gay Head. House No. 870.

1953b A bill accompanying the petition of Edmund S. Cooper and another (Selectmen) that the town of Gay Head be exempted from the payments of county assessments for the maintenance of the Pocasset Sanitarium. House No. 898, which became House No. 2288 and then House No. 2458.

1955 A bill accompanying a petition of Edmund S. Cooper and others relative to the distribution of proceeds of the income tax to the town of Gay Head under conditions with respect to certain county assessments. House No. 476.

1959 A bill accompanying the petition of Lorenzo D. Jeffers for an investigation by a special commission (including members of the General Court) of the feasibility of making improvements in the general conditions in the town of Gay Head. House No. 939.

1960 A bill accompanying a petition of Lorenzo D. Jeffers for an appropriation from the General Fund of a sum of money to help defray the cost of an Indian and whaling museum in the town of Gay Head. House No. 2576.

1962a A bill accompanying the petition of Lorenzo D. Jeffers that the town of Gay Head be authorized to convey Gay Head Cliffs, the cranberry bogs and the Herring Creek to Indian descendants of said town. House No. 2357.

Commonwealth of Massachusetts. House of Representatives.

1962b A bill accompanying a petition of Lorenzo D. Jeffers that the town of Gay Head be authorized to convey certain land to the Gay Head Museum for the purpose of erecting an Indian and whaling museum. House No. 2858.

1962c Special Reports of the Department of Public Works relative to a right of way for public access to Squibnocket Pond in the towns of Chilmark and Gay Head. House No. 3195. December 14.

1963a A bill accompanying the petition of the Federated Eastern Indian League, Inc., for an investigation by a special non-legislative commission of tax assessment and tax collection procedures of the town of Gay Head. House No. 1599.

1963b A bill accompanying the petition of the Federated Eastern Indian League, Inc., for legislation to authorize the town of Gay Head to convey certain land to the Gay Head Museum. House No. 1600.

1964a A bill accompanying the petition of Lorenzo D. Jeffers for prohibiting dragnetting and other trawling in certain waters of the Commonwealth except by residents of the towns of Gay Head and Chilmark who are of Indian ancestry. House No. 598.

1964b A bill accompanying the petition of Lorenzo D. Jeffers that the residents of the town of Gay Head who are members of the Wampanoag Indian Tribe be permitted to fish within the town limits without a license. House No. 599.

1964c A bill accompanying the petition of Lorenzo D. Jeffers that persons of Indian ancestry be authorized to use dragnets and dredges for fish and quahaugs in the waters of the Commonwealth. House No. 600.

1964d A bill accompanying the petition of Lorenzo D. Jeffers for an investigation by a special commission (including members of the General Court) relative to the problems and social conditions of Indian citizens of the Commonwealth. House No. 2087.

1965 Special Report of the State Tax Commission relative to tax procedures of the town of Gay Head. House No. 3442. February.

1966a A bill accompanying the petition of Lorenzo D. Jeffers that the Department of Public Works be directed to make certain improvements to Herring Creek in the town of Gay Head. Harbors and Public Lands. House No. 1395.

1966b A bill accompanying the petition of C. Earl Vanderhoop and others that the Department of Public Works be directed to construct certain accesses in West Basin Road in the town of Gay Head. House No. 2999.

1967 A bill accompanying a petition of Lorenzo D. Jeffers authorizing the transfer of certain state, county, and town land to the Gay Head Indian and whaling Museum in the town of Gay Head. House No. 3752.

Commonwealth of Massachusetts. House of Representatives.

1968a A bill accompanying the petition of Lorenzo D. Jeffers and another for an investigation by a special commission (including members of the General Court) relative to the prevention of discrimination against Indian residents of the Commonwealth. House No. 2594.

1968b A bill accompanying the petition of Lorenzo D. Jeffers and another for an investigation by a special commission (including members of the General Court) of the advisability of returning to the town of Gay Head lands formerly held by Indian citizens. House No. 2976.

1968c A bill accompanying the petition of Lorenzo D. Jeffers and another for an investigation by a special commission (including members of the General Court) relative to the advisability of appointing trustees to oversee and dispose of all existing common lands given to Indian residents of the town of Gay Head with a view to distributing said land to the heirs of said Indians. House No. 3148.

1970 A bill accompanying the petition of Allan F. Jones and another for legislation to authorize the county commissioners of the county of Dukes County to convey to the town of Gay Head a certain parcel of land. House No. 300. Redrafted as House No. 4986.

1971 A bill accompanying the petition of Lorenzo Jeffers for legislation to authorize said Lorenzo Jeffers to fish in and take shellfish from waters located in the town of Gay Head. House No. 4667.

Commonwealth of Massachusetts. Public Statutes.

1882a Provision for support of poor Indians. Chapter 86. Section 23:471.

1882b Indians not included in prohibition. Chapter 9. Section 96:508.

1882c Information against intruders on lands held for Indians. Chapter 182. Section 15:1049.

Commonwealth of Massachusetts. Resolves.

1781 Resolve appointing guardian over the Indian inhabitants of Gay Head.

1785 Resolve on the petition of Silas Paul and others, Gay Head Indians. Appointing guardian over them. Chapter 4.

1790 Petition of Gay Head Indians. Chapter 57. February 2.

1796 Resolve accepting a grant of land from the Gay Head Tribe. Chapter 46. June 17.

Commonwealth of Massachusetts. Senate.

1870 Report of the Committee on Legislation on Gay Head Indians. Senate Report No. 14:2-16. January 26.

Commonwealth of Massachusetts. Supreme Judicial Court.

1866 William B. Mayhew vs. District of Gay Head. Dukes County. In Cases Argued and Determined in the Supreme Judicial Court. October Session. Boston. 129-136.

Commonwealth of Massachusetts. Vital Records.
1841-90 Massachusetts State Archives. Boston, MA.

Cooper, Aaron and Others
1869 Petition to the General Court for the protection of land rights at Gay Head. In the papers accompanying the Massachusetts Acts and Resolves of 1869. Chapter 103. Massachusetts State Archives. March 3.

Earle, John Milton
1861 Report to the Governor and Council concerning the Indians of the Commonwealth, under the Act of April 6, 1859. Mass. Senate Doc. No. 96. Boston: William White.

Elbert, Hazel E.
1983 Letter of Acting Director, Office of Indian Services, BIA, to Gladys A. Widdiss. BAR Files. July 28.

1985a Letter of Deputy Director, Office of Indian Services, BIA, to Gladys A. Widdiss. BAR Files. June 6.

1985b Letter of Deputy Director, Office of Indian Services, BIA, to Robert C Hahn. BAR Files. July 24.

Guardians For the Indians in Dukes County
1747 Memorial to General Court of November 25. Massachusetts State Archives. 31:550-550A.

Henry, Sarah
1843 Deposition, October 20. Dukes County Land Records, 29:178. Registry of Deeds, Edgartown, MA.

Howwaswee, Zacheus and Others
1855 Petition of overseers of the Gay Head Indians. In papers accompanying the Masschusetts Resolves of 1855. Chapter 15. January 24. Massachusetts State Archives.

Howwoswee, Zacheus
1874 Estate Papers. Dukes County Probate Docket DI/1612. Registry of Probate, Edgartown, MA.

Indian Inhabitants of Gay Head
1759 Petition to General Court of Massachusetts. February 21. Massachusetts State Archives. Microfilm Documents 33:86.

Indians and People of Colour at Gay Head
1838 Petition to General Court upon the sale and use of ardent spirits among their tribe. Legislative papers accompanying the Massachusetts Acts of 1838. Chapter 101. Massachusetts State Archives. February 10.

1839 A petition praying for aid in building a grist mill. In papers accompanying Massachusetts Resolves of 1839. Chapter 75. Massachusetts State Archives. April 9.

Indians of Gay Head.
1767 Petition to Commissioner and General Court. Massachusetts State Archives. 31:416-417. March 23.

Jeffers, Thomas, and Others
1896 Petition of citizens of Gay Head to the General Court that a line be defined between a certain portion of the boundary of the towns of Gay Head and Chilmark. In papers accompanying the Massachusetts Acts of 1896. Chapter 187. Massachusetts State Archives. January 9.

Jeffers, Thomas, Isaac D. Rose, and Aaron Cooper
1869 Petition of Citizens of Gay Head to General Court. In the papers accompanying the Massachusetts Acts of 1869. Chapter 213. Massachusetts State Archives. January 30.

Kiley, Thomas R.
1984 Letter of First Assistant Attorney General of Massachusetts to Chairmen of Senate and House Committees on Local Affairs. Massachusetts General Court. March 21.

Marston, Charles
1866 Report on the boundaries at Gay Head. In papers accompanying the Massachusetts Resolves of 1866. Chapter 67. Massachusetts State Archives.

Mayhew, Smith
1844 Letter to Governor and Council of the Commonwealth of Massachusetts. Massachusetts State Archives. Special Indian File. January 8.

Mayhew, Theodore G. (Judge of the Probate Court)
1870 Appointment of Joseph T. Pease and Richard L. Pease as Commissioners to divide the common and undivided lands in the Town of Gay Head. December 5. Dukes County Probate Docket DI/235. Registry of Probate, Edgartown, MA.

Morse, Betsey
1843 Deposition, October 20. Dukes County Land Records, 29:179. Registry of Deeds, Edgartown, MA.

Muttach
1681 Covenant of September 11. Massachusetts State Archives. Microfilm Documents 31:10.

Overseers of Gay Head
1857 Petition of Isaac D. Rose and others, overseers of Gay Head, for aid to erect a new school house. In papers accompanying the Massachusetts Acts of 1857. Chapter 30. Massachusetts State Archives. April 14.

Pease, John
1820 Deposition regarding Joseph DeGrass, December 23. In the papers accompanying the Massachusetts Acts of 1821. Chapter 46. Massachusetts State Archives.

Pease, Joseph T. and Richard L. Pease

1878a Indian Lands at Gay Head. Dukes County Probate Records, vol. 59. Registry of Probate, Edgartown, MA.

1878b Indian Lands at Gay Head. Dukes County Land Records, vol. 65. Registry of Deeds, Edgartown, MA.

n.d. Map of Gay Head showing the divisions of the Common Lands. Registry of Probate, Edgartown, MA.

Pease, Richard L.

1871 Report of the Commissioner Appointed to Complete the Examination and Determination of All Questions of Title to Land, and of All Boundary Lines Between the Individual Owners at Gay Head, on the Island of Martha's Vineyard. Boston: Wright and Potter.

Proprietors of Gay Head

1747 Petition to Commissioners and General Court. Massachusetts State Archives. 31:551. November 30.

1749 Petition to Commissioners and General Court. Massachusetts State Archives. 31:643. September 5.

1811? Petition in response to the petition of "The Few Remaining Indians of Gay Head." In papers accompanying the Massachusetts Acts of 1811. Chapter 78. Massachusetts State Archives.

Province of Massachusetts Bay

1745a Journal of the House of Representatives. 22:106. November 1.

1745b Journal of the House of Representatives. 22:126. December 20.

1746 Journal of the House of Representatives. 23:249.

1747a Journal of the House of Representatives. 24:176. October 20.

1747b Journal of the House of Representatives. 24:200. November 3.

1753 Journal of the House of Representatives. 30:22. June 7.

1755a Journal of the House of Representatives. 31:277. April 23.

1755b Journal of the House of Representatives. 32(1):89. June 17.

1755c Journal of the House of Representatives. 32:173. September 6.

1760 Journal of the House of Representatives. 37(1):117. December 23.

1764 Journal of the House of Representatives. 40:226. June 24.

1774 Province Laws of 1773-1774. Chapter 164:788. March 8.

Province of New York

1685 Deed of Mathew Mayhew to Col. Thomas Dongan. May 12. Papers of the Corporation for the Propagation of the Gospel. Box 3. Folder 1. New England Historic Genealogical Society. Boston, MA.

Rodman, Abram, Rosanna G. Rodman, and six others of the Gay Head Tribe of Indians.
1869 Petition to the General Court asking to be enfranchised. In the papers accompanying the Massachusetts Acts of 1870. Chapter 213. Massachusetts State Archives. May 11.

Salsbury, John, et ux.
1849 Deed to Jophannus Salsbury et al., March 25. Dukes County Land Records, 36:322-23. Registry of Deeds, Edgartown, MA.

Shapard, John A., Jr.
1983 Letter from Chief, Branch of Federal Acknowledgment, BIA, to Arlinda Locklear. BAR Files. October 19.

Simmons, Patricia
1985 Indian Tribes Terminated from Federal Supervision, List December. Bureau of Indian Affairs, Branch of Tribal Relations.

Talman, Peter, et al.
1805 Deed to John Divine et ux., June 3. Dukes County Land Records, 22:339-40. Registry of Deeds, Edgartown, MA.

The Few Remaining Indians of Gay Head
1811 Petition to the General Court. Papers accompanying the Massachusetts Acts of 1811. Chapter 78. Massachusetts State Archives.

Town of Gay Head, MA
1899-1980 Annual Reports of the Selectmen and other town officers of the town of Gay Head.

1900 Register of Voters.

1915 Assessor's Valuation Book.

U.S. District Court. Boston, MA.
1981 James, et al. v. Town of Gay Head et al. Civil No. 81-3204.

1983 James, et al. v. Bellotti, et al. Civil No. 83-3494.

1985 James, et al. v. U.S. Department of Health and Human Services, et al. Civil No. 85-417. August 14.

U.S. Life-Saving Service
1899 Articles of Engagement and Medical Inspections for Surfmen. Gay Head Life-Saving Station. July 29. NARA. RG 26. Records of the U.S. Coast Guard.

Vollmann, Timothy
1985 Letter of Associate Solicitor-Indian Affairs, U.S. Department of the Interior, to Robert C. Hahn. BAR Files. October 24.

Spirit of New England Tribes

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Vineyard in 1691). The Indians requested a review two years later that ended with the same results. The London-based missionary society, the Company for the Propagation of the Gospel in New England, then bought Gay Head from Dongan to encourage the Indians to cultivate what had been their land and to protect the Christian Indians from land-hungry English neighbors. Unfortunately, the company leased some of the best Indian acreage to whites until 1727, when the Gay Headers agreed to relinquish an eight-hundred-acre parcel in exchange for the company's commitment to protect the rest of the peninsula for exclusive Indian use. The population of the Gay Head community in the 1740s ranged between 113 and 165 souls, a dramatic reduction from the late prehistoric population which may have numbered as many as 10,000 for the entire island. Estimates of Gay Head (as well as Mashpee) population in the historic period have always been approximate because of the many who were away for extended lengths of time working in whaling and other industries.

In 1746 the Massachusetts legislature voted to appoint three guardians for Gay Head, and for over a century thereafter the Indians lived under the intermittent authority of overseers whose financial and land management practices they found to be a perpetual source of annoyance. They petitioned frequently, for example, against the overseers' leasing policies, the removal of their households from leased land, the necessity of renting land for their own purposes, the lack of sufficient grazing for their cattle, the inadequate supplies of firewood, and the nonpayment of leasing revenues that were due them. By 1764 the racial composition of the community had begun to change; mating with Afro-American and English had been reported among all Indian populations of the island, and of the 276 persons identified as Indian at Gay Head, only about one-quarter could claim unmixed descent.

The Company for the Propagation of the Gospel, being an English organization, apparently forfeited its title to land on Martha's Vineyard in the course of the American Revolution, and the commonwealth of Massachusetts subsequently administered all Indian lands within its borders. For almost a century thereafter, the state considered the Gay Head Indians to be its involuntary wards, who could not buy or sell land except to each other and could not make any legal contracts, sue or be sued by the courts, or vote in state or national elections.

From the seventeenth to the nineteenth centuries, the Gay Head people enjoyed a distinctive communal existence based upon collective rights to land and frequent sharing of food, tools, labor, and

FAITH AND BOUNDARIES:

COLONISTS, CHRISTIANITY AND COMMUNITY AMONG THE WAMPANOAG INDIANS OF MARTHA'S VINEYARD, 1600-1861

DAVID SILVERMAN

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Massasoit left him isolated and vulnerable to challenges by Christian rivals. Most threatening of all were developments in Nashuakemuck, a loosely organized territory right on Aquinnah's doorstep. There, a local elite named Momonaquem and a minor sachem named Pammehannit filled the vacuum by forming two Christian meetings and assuming their offices.[104] Momonaquem not only claimed descent from a principal Aquinnah man, but became a Christian minister and teacher. He traveled to the mainland with Thomas Mayhew Jr. to visit the praying Indians of Natick. His son, John Momonaquem, preached on the east end, later served as a counselor at Gay Head, and eventually married into a large Takemmy family.[105] Traditionally, Indian leaders used polygamous marriages to broaden their kin ties and thus their base of support, but Momonaquem was showing that monogamous Christians could use the church to fashion networks across the island that boosted their reputations at home.[106]

Pammehannit made a similar climb up the Wampanoag ranks. As one of the earliest Christians and a founding member of the Nunnepog congregation, he had strong ties to the most influential colonists and Wampanoags on the east end. His younger brother, Janawanit, served as Nashuakemuck's minister and teacher. Later, Pammehannit's son, Japheth Hannit, added further luster to the family name despite the pressure of the Wampanoags' belief that God had blessed him in the womb. As an adult, Hannit ministered at the east end and Nashuakemuck, and he married Sarah, who was the daughter of Ketsumin, first deacon of the Nunnepog congregation, and the niece of Nahnehshehchat, a prominent church member of Chappaquiddick.[107] Mittark could not help but worry that minor elites like Momonaquem and Pammehannit might draw off his supporters or contest his authority by combining their inherited status with the long reach of Christianity's institutional linkages.[108]

Mittark felt most at risk when an unlikely combination of Englishmen, praying Indians, and the paramount Wampanoag sachem began encroaching on his jurisdiction. In 1653, Nashuakemuck sachems Wassulon

104 *Indian Converts*, 13, 20, 46–7, 129; personal conversation with Tobias Vanderhoop, June 2000.

105 *Strength Out of Weaknesse*, 176–7 (Natick; note that Momonaquem is spelled "Hamanequinn" in this tract); *Plymouth Records*, 10:261–3 (teacher; where he is referred to as "Memeekeen"); *Indian Converts*, 140 (son).

106 Ann Marie Plane, *Colonial Intimacies: Indian Marriage in Early New England* (Ithaca: Cornell University Press, 2000), 22–3.

107 *Indian Converts*, 20 (Janawanit), 44–5 (Japheth), 87 (Ketsumin), 129 (Pammehannit), 166 (Sarah); DCD, 1:83.

108 For shared concerns among mainland sachems, see Harold W. Van Lunkhuyzen, "A Reappraisal of the Praying Indians: Acculturation, Conversion, and Identity at Natick, Massachusetts, 1646–1730," *NEQ* 63 (1990), 402, 404; Daniel Mandell, "'Standing by His Father': Thomas Waban of Natick, circa 1630–1722," in Robert S. Grumet, ed., *Northeastern Indian Lives, 1632–1816* (Amherst: University of Massachusetts Press, 1996), 167–70.

fear of corrupting the meaning, occasionally he, like Mayhew Jr., consented to using *Manitoo* for "God," as did Abraham Pierson in a catechism for the Montauks of Long Island.[39] *Matcheanitto* stood for "the Devil" in Eliot's writings, combining the Native word for "bad," *matchit*, with *manitou*, but he followed Mayhew's conflation of Satan and Cheepi in his translation of "Hell" as *Chepiohkomuk*. Other missionaries, including John Cotton Jr.'s son, Josiah, used the word *Awakompanaonganit* for Hell, which meant something like "lost people."[40] Indians might have understood this term as a reference to the souls of malicious evildoers sentenced to haunt under Cheepi's rule before being admitted to Kiehtan's House. Pierson called those souls *Mittachonkq*, the force in the Natives' dual-soul scheme that sustained the body while the other explored the dreamworld.[41] In the early eighteenth century, Cotton Mather, who probably drew on Eliot's writings for Indian terminology or consulted with Josiah Cotton or the Vineyard's Experience Mayhew, used *negonne kuh-quttum* for "predestination," which literally translated meant, "previously appointed." His choice for "resurrection" was *pomatamooganit*, combining the words *pomantam* (he lives) and *moocheke* (much, many more).[42] Christianity was filled with novel concepts, but applying Wampanoag names to them and then qualifying the definitions over and over again through face-to-face meetings had the potential to bring

39 Abraham Pierson, *Some Helps for the Indians, Showing Them how to improve their natural Reason*, 25, app. to John Eliot, *A further Accompt of the Progresse of the Gospel among the Indians in New-England* (London, 1659), 25. To analyze Native language terms in Eliot's writings, I use James Hammond Trumbull, *Natick Dictionary*, Bureau of American Ethnology Bulletin No. 25 (Washington, D.C.: Government Printing Office, 1903). For other texts, I depend upon *Native Writings*, vol. 2. This paragraph compresses a fifty-year span of Native language texts while recognizing the need for a study of the evolution of Massachusett and Wampanoag religious terminology.

For Eliot's approach to translation, see Gray, *New World Babel*, 56–85; Stephen Andrew Guice, "The Linguistic Work of John Eliot" (Ph.D. diss., Michigan State University, 1990), 101–85. For a contemporary's thoughts on using loanwords in translation, see Increase Mather, *A Letter Concerning the Success of the Gospel, amongst the Indians in New England* [1687], in C. Mather, *Triumphs of the Reformed Religion* (Boston, 1691), 92. Some Catholic missionaries working in the Spanish Empire also preferred to leave certain Christian terms untranslated. See Vicente Rafael, *Contracting Colonialism: Translation and Christian Conversion in Tagalog Society under Early Spanish Rule* (Ithaca: Cornell University Press, 1988), 29; and David J. Weber, *The Spanish Frontier in North America* (New Haven: Yale University Press, 1992), 110.

40 *Auwa, auwog, auwate* = them, people, anyone; *ompenumanut* = to lose them; *ompenum* = he looseth it. The term is found in Josiah Cotton, "Vocabulary of the Massachusetts (or Natick) Indian Language," *MHSC* 3d ser., 2 (1830), 155.

41 Pierson, *Some Helps for the Indians*, 29.

42 C. Mather, *An Epistle to the Christian Indians, Giving them a Short Account, of what the English Desire them to Know and to Do, In order to their Happiness* [*Wussukwhonk En Christianeue asuh peantamwae Indianog, Wahteauwaheonaount Teanteaquassinish, Nish Englishmansog Koktantamwog Indianog Wahteaunate kah Ussenate, En michemohtae Wunniyeauonganit*] (Boston, 1706), 4.

the Indians' Christian knowledge into close – if not always exact – alignment with that of their English counterparts, all the while emphasizing that the faith belonged to them.

The most active disseminators of these ideas were Wampanoags themselves, beginning with Hiacoomes then expanding to include schoolteachers such as Momonaquem and John Tackanash, sachem/preachers like Mittark and Wompamog, and shortly a variety of ordained church officers and male and female lay leaders.[43] Although no contemporary accounts of the Indians' pedagogy survive, a transcript of a chance conversation in 1708 between Governor Lovelace of New York and an unnamed Wampanoag from the mainland village of Dartmouth offers suggestive hints.[44] Lovelace quizzed the Indian on his Christian knowledge, which he answered (recorded in the vernacular) by using his hand as a mnemonic device, a common Indian method. The Wampanoag responded to Lovelace's question about the Trinity as follows: "He is one God (pointing to the Palm of his Hand.) and yett he Dree (pointing to his Three extended Fingers on that Hand.) – what you callum, my Lord – methink, you calum, Dree Person." As to whether all people were condemned to hellfire, the Wampanoag man exclaimed:

> Maybe no! . . . You see my-Lord! (Extending Three Fingers & pointing to his middle Finger,) He speakum Him (pointing then to his For-finger,) You so big Angry with Man. Me Luvum Man. What me do you no Angry[?] Then He (pointing to his Fore-finger,) speakum Him (so pointing to his middle Finger,) You go down; You be man; you do all Good Things for man who can do nune. You Dy, that man no Dy. Then you rise again. Then you come up here. Then you show man how to com here; You Lead Man here.

Lovelace was astounded to learn that the Wampanoag's instruction had come only from other Indians, certainly his Vineyard tribesmen, who began proselytizing at Dartmouth in the late 1670s. This might very well have been an exercise used to pass on Christian knowledge during the heyday of the island mission.[45]

The most foreign yet essential Christian concept of all, Original Sin, was not so easily communicated, even in the hands of the most determined and linguistically skilled missionaries. Traditionally Wampanoags believed that spirits might punish individuals and perhaps even groups for their offenses, but they shared nothing of the Puritan idea of corruption inherited by all generations since the time of origins, tainting their best deeds and condemning everyone to eternal torture who did not open his or her heart to a selectively granted divine dispensation. Literal translation had no answer for this

[43] *Indian Converts*, 18, 20, 23, 27, 29, 31, 32, 36, 38–9, 49, 58, 64, 92, 99, 107, 144.

[44] A Conference with an Indian of New England, December 1708, NE Co. MSS, 7957, p. 3.

[45] For an extensive discussion of the use of gesture and metaphor in New England missions, see Laura J. Murray, "Joining Signs with Words: Missionaries, Metaphors, and the Massachusett Language," *NEQ* 74 (2001), 62–93.

Momonaquem traveled to the mainland to preach and take the Lord's Supper with the praying Indians of Natick, and during a pause the Wampanoag took some time to discuss his spiritual beliefs with several colonists, including William French. According to French, Momonaquem defined sin as "a continuall sickness in my heart" as well as "a breach of all God[']s Commandments," that could be overcome only "by the satisfaction of Christ," a realization that came to him after God "stripped me bare as my skinne."[51] Momonaquem was not alone in his orthodoxy. In 1659, a handful of Vineyard Wampanoags rose before a mixed audience of Indians and Englishmen to narrate the evolution of their faith that Christ died for them – the essential act for becoming a full member of many Puritan churches. Convinced of the Indians' sound doctrine and grace, the baptized colonists recognized them as "visible saints" and proclaimed their meeting a "gathered church" possessing equal standing to English congregations.[52] Eleven years later, Eliot and Cotton traveled to the Vineyard to ordain Hiacoomes as a pastor and John Tackanash as a teacher – the first North American Indians to ever hold such positions – and to install John Nahnoso and Joshua Momatchegin as ruling elders.[53] The missionaries' confidence in them speaks volumes.

The Wampanoags' leading lights proved that they belonged in the Congregationalist fold, but because they carried their entire communities with them rather than formed segregated Christian reserves, their churches contained room for the tepid, unorthodox, and even profane. Some Wampanoags avoided complex theological issues such as the nature of the Trinity, claiming these mysteries were "too deep for us to understand."[54] Others refused to send their children to school, neglected family prayer, or persisted in immorality, and yet called upon God when in trouble.[55] The devotion of some Natives to Jehovah ebbed and flowed with his blessings.[56] One *powwow* tried to hedge his bets by encouraging his wife to adopt Christianity while he kept his old *manitous*, explaining that although "she served a God that was

[51] *Strength Out of Weaknesse*, 176–7, 192–3 (quotes).

[52] "Historical Collections," 204, 205. Cf. Neal Salisbury, "Red Puritans: The 'Praying Indians' of Massachusetts Bay and John Eliot," *WMQ* 31 (1974), 29–31; and Jean M. O'Brien, *Dispossession by Degrees: Indian Land and Identity in the Natick, Massachusetts, 1650–1790* (New York: Cambridge University Press, 1997), 54–5, 57, who doubt the extent to which praying Indians understood and accepted the Congregationalist message.

[53] John Eliot, *A Brief Narrative of the Progress of the Gospel Among the Indians of New England*, W. T. R. Marvin, ed. (1670; Boston, 1868), 20–1; idem., "Account of the Indian Churches (1673)," 124, 126; "Historical Collections," 205; Increase Mather, *A Letter Concerning the Success of the Gospel amongst the INDIANS in New-England*, app. to *Conquests and Triumphs*, 66; *Indian Converts*, 10, 14, 34; *Some Account of those English Ministers*, 300. C. Mather, *Magnalia Christi Americana*, 1:567, 569, incorrectly dates the ordination as 1666.

[54] *Indian Converts*, 265.

[55] *Indian Converts*, 113.

[56] *Indian Converts*, 113, 244–5.

community law kept Gay Headers from selling to non-Indians, and Amos was the most active Indian land trader on the island. Hossueit had closed off a prime market opportunity to needy families who might have otherwise unloaded their claims at Aquinnah and moved to another Wampanoag community, a fairly common practice elsewhere on the island.[95]

The Baptist church was a final though less measurable cord between the proguardian petitioners. In 1774, the signatory Silas Paul would become the first ordained Baptist minister at Gay Head since the death of Jonah Hossueit.[96] His congregation boasted only thirteen full members, so it is possible that most, if not all, of the petitioners in 1767 were Baptists who resented the Congregationalist minister who had quit their ranks. Like most historical issues in local Indian politics, there is no way to know for sure. What is clear, though, is that Hossueit had his enemies and that the 1767 petition and subsequent documents requesting colonial intervention had as much to do with unspoken, internal rivalries as the issues set forth in writing.

Nevertheless, Hossueit's performance, first against the Amos brothers, then against the guardians, established him as Aquinnah's preeminent public figure, a position he did not forfeit until his death in 1772. In the early 1760s, he went all the way to the Superior Court in Barnstable to defend his rights to Pechacah's Neck in Chilmark, just outside of Gay Head, against the rival claim of colonists Benjamin and Nathan Skiff. His victory there proved that he could beat the English in the same courts that regularly

95 Several Indians sold Amos land at places other than where they lived. In the 1750s, Joseph Amos, Henry Amos, and Jemimiah Almick of Christiantown, and Isabel Ohhomon of Edgartown deeded Elisha Amos rights at Gay Head (DCD, 8:148, 191, 552). A number of families at Aquinnah made similar grants, as when James Talman sold part of Sengekontacket in 1753 and 1759, or Judah Pocknet and Bethia Tockanot sold their Roaring Brook land in 1756 (DCD, 8:267, 431, 9:82).

Shared surnames between island and mainland Wampanoag communities suggest the opportunities for Indians to sell land in one place and move to another. The Vineyard Indians and the Wampanoags of Sandwich held in common the names Job (which clustered at Sengekontacket), Sampson (Chappaquiddick), Robin (Chappaquiddick), Chamuck (Christiantown), Francis (Gay Head), Joel (Chappaquiddick and Gay Head), Amos (Vineyard-wide), Coomes (Nashuakemuck), Cagenhew (Chappaquiddick), Webquish (Chapppaquiddick), and Moses (Chappaquiddick). Sandwich residents Joshua Coomes and Jesse Webquish were likely former residents of the Vineyard. See "Votes at an Indian Meeting, Sandwich, October 1761," Misc. Bound MSS, MHS.

Shared surnames with the Dartmouth Wampanoags included Simon (clustered at Chappaquiddick), Sampson (Chappaquiddick), Amos, Joel (Chappaquiddick and Gay Head), Abel (Nashuakemuck), Jeffery (Chappaquiddick), and Job. Rachel Amos had moved from the Vineyard to Dartmouth in the late seventeenth century, Jeremy Joel in the mid-eighteenth century. See "List of Indians at Dartmouth, Aug. 25, 1763," Misc. Bound MSS, MHS. On the Amos connection with Dartmouth, see E. Mayhew, *Indian Converts*, 38. On Joel, DCD, 9:42.

96 Backus, *History of New England*, 1:438–9.

manumission, or running away, while others were sailors from all corners of the globe whose travels had landed them in America.[11] The side streets of New Bedford, which by the early nineteenth century had superceded Nantucket to become the busiest whaling port in the world, contained what one magazine reporter described as "a greater variety of human species than is elsewhere to be found under the bright sun of Christian civilization. Europeans there are of every flag and language; Native Yankees . . . Gay Headers and negroes; aboriginals and Africans; Island Portuguese as plenty as whales'-teeth; with an occasional sprinkling of Chinese, Luscars, Australians, and Polynesians, cannibals and vegetarians."[12] Sometimes a certain racial egalitarianism emerged from the rowdiness of dockside watering holes and the working solidarity of the ship, but it was equally common for off-duty sailors to separate into gangs of "whites" and "non-whites," for captains to insist on segregating their crew's lodgings, and for certain taverns and boardinghouses to cater to "whites only."[13] Thus, regardless of their separate origins, "people of color" in New England port towns tended to form their own neighborhoods, like the heterogeneous "New Guinea" district of Nantucket, and webs of sociability that ultimately introduced working men of color and Native women.[14] And aside from mutual attraction and affection, these groups had good practical reasons to consider one another as mates, with Indian women lacking a sufficient pool of courtiers at home, and colored seamen often starved of female company and

[11] William Dillon Pierson, *Black Yankees: The Development of an Afro-American Subculture in Eighteenth-Century New England* (Amherst: University of Massachusetts Press, 1988), chap. 2; James Oliver Horton, *Free People of Color: Inside the African American Community* (Washington, D.C.: Smithsonian Institution Press, 1993), 26, 30–1, 34.

[12] "A Summer in New England: Paper One," *Harper's New Monthly Magazine* 124 (June, 1860), 9. On New Bedford's growth see Daniel Ricketson, *The History of New Bedford, Bristol County, Massachusetts* (New Bedford, 1858), 58, 59, 72, 300–302; James Freeman, "Notes on New Bedford," *MHSC* 2d ser., 3 (1815), 18.

[13] On at-sea racial segregation and inequality, see Margaret S. Creighton, *Rites and Passages: The Experience of American Whaling, 1830–1870* (New York: Cambridge University Press, 1995), 31, 146, 156–7; Daniel Vickers, "Nantucket Whalemen and the Deep-Sea Fishery: The Changing Anatomy of an Early American Labor Force," *JAH* 72 (1985), 289–90. Emphasizing relative tolerance onboard is Jeffery Bolster, *Black Jacks: African American Seamen in the Age of Sail* (Cambridge, Mass.: Harvard University Press, 1997), chap. 2, esp. 176–7, and with a class emphasis, Marcus Rediker, *Between the Devil and the Deep Blue Sea: Merchant Seamen, Pirates, and the Anglo-American Maritime World, 1700–1750* (New York: Cambridge University Press, 1987); Peter Linebaugh and Rediker, *The Many-Headed Hydra: Sailors, Slaves, Commoners, and the Hidden History of the Revolutionary Atlantic* (Boston: Beacon Press, 2000).

[14] Nathaniel Philbrick, *Abram's Eyes: The Native American Legacy of Nantucket Island* (Nantucket: Mill Hill Press, 1997), 197. Russel Lawrence Barsh, "'Colored' Seamen in the New England Whaling Industry: An Afro-Indian Consortium," in James F. Brooks, ed., *Confounding the Color Line: The Indian–Black Experience in North America* (Lincoln: University of Nebraska Press, 2002), 76–107.

Commonwealth – General Court – Senate.

SENATE..... .....No. 96.

REPORT

TO THE

GOVERNOR AND COUNCIL,

CONCERNING THE

Indians of the Commonwealth,

UNDER THE ACT OF APRIL 6, 1859.

By JOHN MILTON EARLE,
COMMISSIONER.

BOSTON:
WILLIAM WHITE, PRINTER TO THE STATE.
1861.

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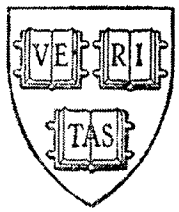

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Commonwealth – General Court – Senate.

SENATE..... .....No. 96.

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Commonwealth of Massachusetts.

EXECUTIVE DEPARTMENT, COUNCIL CHAMBER,
BOSTON, March 8, 1861.

To the Honorable the House of Representatives :—

I herewith transmit for the information of the General Court, the Report concerning the Indians domiciled in this Commonwealth, made by the Commissioner appointed in accordance with the provisions of chapter 266 of the Acts of the year 1859.

JOHN A. ANDREW.

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Commonwealth of Massachusetts.

IN SENATE, March 15, 1861.

The Committee on Claims, to whom was committed the Report of John Milton Earle, Commissioner under the Act of April 6, 1859, concerning the Indians of the Commonwealth, have considered the same, and recommend that the same be printed.

EDWIN WALDEN, *Chairman.*

SENATE, March 15, 1861.

Accepted.

Sent down for concurrence.

S. N. GIFFORD, *Clerk.*

HOUSE OF REPRESENTATIVES, March 16, 1861.

Accepted, in concurrence.

WILLIAM STOWE, *Clerk.*

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Commonwealth of Massachusetts.

To His Excellency, JOHN A. ANDREW:

The undersigned, Commissioner under the Act of April 6, 1859, concerning the Indians of this Commonwealth, having attended to the duties of his appointment, presents in conformity with the provisions of that Act, the following

REPORT.

By the provisions of the Act, under which he received his appointment, the Commissioner is required "to examine into the condition of all Indians and the descendants of Indians domiciled in this Commonwealth, and make report to the governor, for the information of the general court, on the following matters, namely:

"1. The number of all such persons, their place of abode, their distribution, whether by tribes or otherwise, classifying them by age and sex, and distinguishing between the married and single; and also the number of persons reputed Indians, who are of mixed or other race.

"2. The social and political condition of all such persons, including their municipal, religious, and educational organization, and their relation, individual and municipal, to the counties, towns, or districts in which they dwell.

"3. The economical state of all such persons, including the specification of all property of theirs in lands, and whether the same is held in severalty or in common, and whether now in their own possession, or unlawfully possessed and occupied by others, and, in the latter case, by what color of alleged

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title; and also what proportion of such persons are paupers, dependent on the towns in which they dwell, or on the State.

"4. All such facts in the personal or social condition of the Indians of the Commonwealth, as may enable the general court to judge whether they can, compatibly with their own good and that of the other inhabitants of the State, be placed immediately and completely, or only gradually and partially, on the same legal footing as the other inhabitants of the Commonwealth."

Immediately on my appointment, I entered upon the duties thereof. I soon found that I had entered on a wide field of research, with much ground to traverse and little to gather, and that little so scattered and hidden in the mass of other matter, everywhere surrounding it, as to make the pursuit a matter of much labor, with comparatively insignificant returns. Yet these returns were necessary, and must be had, at whatever sacrifice of time and labor. Had the inquiries been confined to the Indians and descendants of Indians who are residents of the reservations, who compose somewhat distinct communities, and who are considered the special wards of the State, the labor would have been comparatively trifling; but even to obtain fully and accurately the facts and statistics in relation to these, is no small work. Situate as most of them are, near the seaboard, in the immediate vicinity of our fishing and commercial ports, the temptations to a race naturally inclined to a roving and unsettled life, are too great to be resisted, and nearly all of the males, first or last, engage in seafaring as an occupation. Thus, the men are drawn away from home, and are often absent for years at a time, frequently without their friends knowing where they are. The women, left behind, seek employment wherever it can be had, usually in the neighboring towns and cities. It was found, that, in New Bedford, alone, there were about one hundred and fifty persons of the Indian race, drawn from various tribes, exclusive of the very considerable numbers at sea in New Bedford ships, whose residence is elsewhere. Few of these consider themselves permanently located there, but generally, are looking forward to the time, more or less remote, when they shall return to the places of their nativity, finally to mingle their dust with that of their fathers. After thus leaving home, they frequently

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remove from place to place, keeping up no correspondence or communication with those they have left; till at last their place of residence ceases to be known to their friends, and all trace of them is lost. Several such cases have occurred, in some of which, after much correspondence and inquiry, the parties have been found, while in others all investigation has been fruitless. The difficulty of tracing them is much increased by their humble social position and obscure station in life, known only to a few directly about them, and those mostly persons whose position in the community is similar to their own.

An incident that occurred during the progress of my inquiries will illustrate the facility with which they lose the knowledge of each other's residence and the consequent difficulty of procuring the desired statistical information. At one of the public hearings, a claim was entered for a tract of land in an adjoining town, of which the complainant alleged that he was the heir by collateral descent, there being no heir by direct descent surviving, and that the land was unlawfully possessed and occupied by another. The original Indian title to the property was found to be good, but, on investigation, it was ascertained that there were numerous heirs by direct descent living, and that two of them had resided during their whole lives within three or four miles of the property, and, at that time and for years preceding, had dwelt within six miles of the complainant, yet without either he or they having any knowledge of each other. This appears the more singular, as the complainant had been pursuing the matter for years, without any suspicion of the existence of other heirs, till he was informed of it by the Commissioner.

In another case, a woman 45 years of age, a widow, on being questioned as to her family, replied that she had none living. She had had, as she said, one daughter, born when she was in her fifteenth year. Five years afterward, her husband deserted her, taking the child with him. This was twenty-five years since, and as, during that time, she had never heard any thing of her daughter, she supposed that she must be dead. In the further investigations of the Commissioner, it was found that the daughter was living, a respectable woman, the wife of a white man, and the mother of three children; and she was as

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ignorant of her mother's existence as the mother was of hers. They had for many years resided within twenty-five miles of each other, and, for none of the time, more than forty-five miles apart. When such difficulties attend the investigation concerning those who belong to tribes having distinct organizations, it may well be inferred how greatly they are multiplied, in relation to the very large number scattered in various parts of the State, who have no organization, no central point, no records, and no common bond of union, whose descent itself is unknown, even to themselves, except by the tradition that they are Indians, confirmed by their physical characteristics, and frequently where these characteristics have been so effaced by admixture with other races, that they are not recognized as Indians, by the people among whom they dwell.

The imperfection of the early records of towns where there were Indian settlements has been a source of much embarrassment, and has caused no little extra labor. Enough was often found to encourage further research and inquiry, which, too frequently, ended in leaving the subject in a state of as much perplexity as when first commenced. The records of most of the towns which have been examined, contain a few of the marriages, births, and deaths, but, of far the greater portion, no record whatever could be found, while, of the marriages and deaths, which are recorded, the parentage of the parties is given in so few instances, that the information derived therefrom is far less satisfactory than it would have been, had that addition been made.*

To ascertain all the facts required by the law, under such unfavorable circumstances, concerning some sixteen hundred persons, scattered in various parts of the State, the residence and even the existence of a considerable portion of whom was not previously known, and had to be ascertained, required not only a wide range of personal observation and inquiry, but an extensive correspondence, most of which was necessarily with individuals feeling no personal interest in the subject of inquiry,

* The records of Yarmouth have furnished more complete and satisfactory information than any other that have been referred to. By the kindness of the town clerk, the Commissioner obtained a very complete record of the Yarmouth tribe, which enabled him to settle some doubtful questions, also, in reference to individual members of other tribes.

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and who, therefore, consulted their own convenience or inclination as to the time of replying, or whether to reply at all. Among those most relied on for information have been town officers, particularly town clerks. To the inquiries addressed to these, numbers have responded in the most cheerful manner, and have rendered much assistance. Others have failed to notice, at all, inquiries repeatedly addressed to some of them; sometimes, it is believed, from a vague but groundless apprehension, that their answers might possibly compromise the interests of their towns. For this reason, the return is more deficient as to the political relations of individuals, to the towns in which they reside, than it otherwise would have been, and more so, it is believed, than it is in relation to any other subject of inquiry.

The distinct bands, communities, or tribes, having funds or reservations, or which have had them and are recognized as wards of the State, are the Chappequiddick, the Christiantown, the Gay Head, the Marshpee, the Herring Pond, the Natick, the Punkapog, the Troy or Fall River, the Hassanamisco, and the Dudley. The Indians and descendants of Indians, of whom there are considerable numbers in any one vicinity, whose descent can be distinctly traced, but who do not stand in the same relation to the State, are those of Dartmouth and Yarmouth. There are, in addition, considerable numbers, belonging originally to some of the tribes before named, as the Gay Head, Marshpee, etc., but who, having left them to reside elsewhere, have lost their original rights, as members of the tribes, and are not acknowledged as belonging to them; and some others, residing either in neighborhoods, or scattered abroad in the community, who originated from other sources, or whose descent is not precisely known, but, of whose identity as Indians, there is no doubt.

Of all these, it is safe to assume that there is not one person of unmixed Indian blood. There are a few who claim it, but their claim does not seem to have any satisfactory basis. When it is considered that the intermixture, both with the whites and the blacks, commenced more than two hundred years ago, and that, in the course of ten or twelve generations, there has been an opportunity, from intermarriages among themselves, for the foreign blood early introduced to permeate the whole mass,

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and when it is considered, that the intermixture has been constantly kept up, from the outside, also, down to the present time, it would be a marvel indeed, if any Indian of the pure native race remained. Of the publishments of colored persons entered on the early records of Dartmouth, by far the larger portion are those of negro men to Indian women. In Yarmouth, a large portion of those of Indian descent have intermarried with the whites, till their progeny has become white, their social relations are with those of that color, and they are mingled with the general community, having lost their identity as a distinct class. The same has happened with a portion of the Hassanamisco tribe, and it would have been a fortunate thing for all the tribes, if it had been so with them all. But the mixture in most of the tribes has been more with the negro race than with the white, till that blood probably predominates, though there are still a considerable number, who have the prominent characteristics of the Indians—the lank, glossy, black hair, the high cheek bones, the bright, dark eye, and other features peculiar to the race.

The social, economical, and moral condition of this people, varying somewhat, as it does, in the several tribes, will be referred to in treating of them separately; yet some general considerations in reference thereto are appropriate here. Much ignorance and misapprehension prevail in the community at large, among those who have not had the opportunity of personal observation relative to these remnants of their race. They seem to suppose that they have hardly emerged from their aboriginal state, and although the painted face may not now be seen, nor the war whoop, the tomahawk, or the scalping knife be actually encountered among them, yet that they are not more than a step or two removed from these things; and the questions: "What sort of people are they?" "Do they dress like white folks?" "Can they speak the English language?" "Do they live in wigwams?" or others of a like nature are continually asked. If the querist would reflect that, for more than two centuries, they have lived commingled in a community with the white race, or on their little plantations surrounded by them and in constant intercourse with them, that they are few and the whites are many, and that the tendency of such bodies always is, for the few to assimilate to

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the many, especially where the latter have the stronger characteristics, they would hardly ask such questions as these. A large proportion of the males of the several tribes have always been sailors or laborers of various kinds, and are thus, almost from childhood, brought in constant personal contact and association with the whites, and so afforded the opportunity of acquiring their habits, customs, and modes of thinking. Many of the females, also, have been at service in white families of elevated social position, where they become to a greater or less extent, familiar with the manners and usages of civilized and refined society. The people are, nearly all, comparatively poor, but some of their dwellings will compare, not unfavorably with those of other people of equal means, in their furniture and the order in which they are kept. I have repeatedly partaken of their hospitality, and their tables, their cookery, their lodgings, and whatever else came under my observation, in their humble dwellings, exhibited a neatness not excelled in the mansions of the more affluent whites. The tender of their hospitality was always made with propriety, dignity, and good taste; and, in no instance, was any insincere, mawkish, or embarrassing apology made or attempted, for the quality of the repast provided. It is granted that this was among the better portion of them, and that, like other people, they have those who are rude, vulgar, coarse, and degraded. But, in my visits to them, embracing nearly every family of all the tribes, and some of them two or three times, I have never met an incivility of word, look, or action, from old or young, and, though many of them are shiftless, improvident, and very poor, I have not seen, with but a few exceptions in two or three of the tribes, the squalor of extreme poverty and destitution that are often to be found among the lower class of whites in our large towns and cities.

It would be fortunate, if no shade more gloomy could be given to this picture. But the prejudice of caste, social exclusion, and civil disfranchisement, have done a fearful work with the race. The weight which these have brought to bear on them seems to have almost crushed out even the wish to have it removed, and the mass appear to be sunk into that state of constrained apathy, with which we submit to physical evils that we know are inevitable. On them, moral purity, social refine-

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ment, and intellectual strength and culture, confer no distinction, or give them even an equal position to those of the dominant race who may be far their inferiors in these respects. Having never enjoyed equality of civil and social rights, the conviction seems stamped upon their minds, that, in being created Indians, they were necessarily doomed to their present condition, and that it is vain to contend against their destiny. Thus all aspiration is suppressed, and, where there is no aspiration, there can be no achievement. This feeling, however, is not universal. There are ardent spirits among them who are impatient of the guardianship, and chafe under the disabilities to which they are subjected, and who would gladly find some way of escape. Perhaps some Moses may yet arise among these, who will prepare the minds of the people, and lead the way to their civil and social emancipation.

The natural and almost irresistible tendency of this legal and social proscription is, to laxity of personal morals. He who sees his own rights habitually trampled upon, without the means of redress, becomes regardless of the rights of others; and, where the sources of the higher enjoyments, of emulation and aspiration are taken away, where self-respect is crushed out, and where the acquisition of knowledge, itself, brings with it but a keener sense of degradation and suffering, it is not strange, constituted as men are, that they should seek the means of enjoyment in sensual indulgence. The use of intoxicating liquors, the prolific source of demoralization, prevails more or less in all the tribes, and in some of them to a sorrowful extent, notwithstanding the efforts that have been made to suppress it. No such liquors, it is believed, are sold on any of the plantations, but there are groggeries about their borders, kept by whites, and the laws are inefficient to prevent their introduction on the reservations. As an almost necessary concomitant, licentiousness and other vices more or less prevail, though less in several of the tribes than formerly, and the cases of illegitimacy in most of them have materially diminished.

One of the most hopeful indications for the future of this race, is the repugnance with which they almost universally look upon a state of public pauperism. It seems a puzzle to reconcile this with the apparent want of self-respect manifested in

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some other ways. But, of its existence there is no question. Many of them will live in a state of extreme poverty, deprived of most of the comforts they might enjoy, if they did not shrink from the name of pauper, as a contamination. This feeling, if properly cultivated and directed, might do much toward their social elevation and improvement. To it, we must attribute the comparatively small number of paupers among them, considering the general poverty of the whole as a class. Even in those tribes where the State annually pays more or less toward their support, the recipients of the bounty, generally do not look upon it as charity, or admit that they are paupers. They have a vague idea that the State has large funds drawn from the sale of lands which would have been theirs, and that this belongs to them as a portion of the interest of the proceeds, or that the State has in some other way become obligated to their ancestors, so that whatever they receive is but a just due, for which the State has received an ample equivalent.

It appears that the whole expenditure of the State, for the benefit and support of the Indians, and for State paupers residing among the Indians, for the ten years ending December 31st, 1859, was $29,964.37. This amount includes about $2,500 expended in the construction and repair of meeting-houses, school-houses and other buildings for their use. But it does not include the interest of the Indian school fund, annually applied to the support of their schools.

Of this whole amount, the Dudley Indians have received $7,989.99; Fall River, $5,488.80; Chappequiddick and Christiantown, $4,908.74; Marshpee and Herring Pond, $4,829.90; Punkapog, $2,391.29; Gay Head, $2,314.79; Hassanamisco, $1,476.00; Nantucket,* $366.44. There remains a balance of about $200, paid mostly under the head of State paupers, but which cannot be traced to any particular tribe. Of the sum put to the Hassanamisco tribe, $1,000 was deposited with the judge of probate for Worcester County, to be expended for their benefit as he may direct, after paying a claim for the support, &c. of one Benjamin Phillips, to which more particular reference will be made in our notice of that tribe.

* Within the last ten years, Abraham Quary, the last of the Nantucket Indians, died at an advanced age.

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The payments on account of the Dudley Indians were about $2,000 for the lot and buildings now occupied by them at Webster, and the balance, about $5,900, for their support and the guardian's salary; those to the Fall River and Punkapog Indians chiefly for their support; a small portion of that to the Chappequiddick and Christiantown tribes, for the last sickness and funeral charges of some of their members, but mostly for the support of State paupers (not Indians) resident among them, and therefore not properly chargeable to the Indians. The Marshpee and Herring Pond payments were mostly for State paupers, (not Indians,) and for county roads laid out through Marshpee. Those to the Hassanamisco tribe were entirely in consideration of the loss of the proprietary fund of the tribe by agents of the State, of which a further statement will be given in the notice of that tribe. The payment to Nantucket was for the support of the last of his race on that Island, and he is now dead.

From this it will be seen that there are only three tribes, whose poor are now dependant on the treasury of the State for their support. These are, first, and largest in amount, the Dudley tribe, next, the Fall River, and lastly the Punkapog. The expenditures for the Fall River tribe are somewhat diminishing, while those of the Punkapog are increasing, and the amount required for the two will not probably vary much from five hundred dollars per annum, each, for two or three years to come. With the proper husbanding of the means of the Fall River tribe, it would seem as if some further reduction might be made in their expense to the State. Of the Punkapog tribe, I cannot see any chance for a speedy reduction of their expense, and the State will probably have tangible evidence, in the course of the coming ten years, that it is not as nearly extinct as it has sometimes been represented to be. The diminution of the Marshpee fund, and its early prospective extinction, make it probable that the State will soon be subjected to some expense for the maintenance of the poor in that District, also. Beyond this, no occasion is apprehended of much increase of expense to the State on this account, for some years to come.

The condition of the several tribes presents a broad field for the exercise of a wise benevolence, in the improvement of their social and religious state, and in furnishing the means of better

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education, whenever the resources of the treasury will justify it, of which the legislature, in its wisdom, will judge, as occasion may offer. I have felt it my duty to present some cases, in the separate notices of the several tribes, where small appropriations for specific objects seem, almost imperatively, to be required.

CHAPPEQUIDDICK TRIBE.

The Chappequiddick Indians occupy the northerly portion of the island of that name, lying on the easterly side of Martha's Vineyard, from which it is separated by Mattakeeset Bay, forming Edgartown Harbor. The Straight, at the northerly part of Edgartown Village, is very narrow, not more than an eighth of a mile wide, and there is a ferry between the two islands. The whole population of the tribe, including one family in New Bedford, and one in Edgartown, is seventy-four, as follows:—

Families,		17
Males,	36	
Females,	38	
		74
Foreigners,		7
Under 5 years of age,		2
From 5 to 10 years of age,		7
10 to 21 years of age,		15
21 to 50 years of age,		39
50 to 70 years of age,		8
Over 70 years of age,		3

The three persons over 70 are of the ages respectively of 76, 78, and 83; the two latter females and widows. The whole number returned by the commissioners in 1849 was eighty-five, from which one should be deducted, who was only a visitor from Christiantown, leaving the whole number eighty-four.

The mortality here, as in several of the other tribes, has been enormously large during the last eleven years. In this respect it takes the fourth rank, Christiantown tribe having lost in that time, of those who were living in 1848, sixteen out of forty-eight, or just one-third; Marshpee ninety-two out of three hundred and five, or 30 per cent.; Herring Pond twenty out of fifty-five, or

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almost 30 per cent.; and Chappequiddick twenty-three out of eighty-four, or about 27½ per cent. The births, during the same period, of children now living, have been only eleven, or less than half the number of deaths, so that the population, as will be seen by the tabular list, (see Appendix,) has been reduced from eighty-four to seventy-four, notwithstanding the addition of two or three by marriage within that time.* In 1828 the number of the tribe was one hundred and ten, showing a falling off since that time of thirty-six, or about one-third—a most fearful diminution. The commissioners' report in 1849 says: "The location appears to be remarkably healthy; not an individual, at the time of our visit, being confined by either chronic or acute disease." Yet, without any fatal epidemic having been among them, they dwindle away and disappear. The sea-faring life, which nearly all of the men follow, to a greater or less extent, is, unquestionably, unfavorable to the increase of the population, but is not sufficient to account for the great diminution that has occurred. There are those who believe there is some inherent physiological defect in the constitution of the race, which unfits them for the habits of civilized life, and that they must necessarily sink under its influence, and pass away. But such a theory is irreconcilable with the sound philosophy of the adaptation of the whole human race to a state of progressive advancement and improvement, and with the ordering of a wise and beneficent Providence; and the gradual increase of the population of Gay Head, though placed under unfavorable circumstances, indicates that no such radical defect exists. More satisfactory reasons for this mortality may be found in the following causes:

1. The comparatively sudden change from the habits and modes of living of barbarous life to those of civilization, without waiting for that progressive physical and mental development which takes place when the process is more gradual, and which would adapt them to the change.

* It will be noted here that the deaths of children born within the last eleven years are not included in this statement, no account having been taken of them. Allowing only the usual rate of mortality among that class, it would swell the whole number of deaths in this tribe to over thirty, being equal to an annual average of one death in every twenty-eight persons, or about double the average of the country towns of the State.

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2. The habits of intemperance and licentiousness, which always, for a time, follow the contact of civilized and barbarous races, which not only carry off their victims prematurely, but so far impair the constitutions of their immediate descendants, as to make them more vulnerable to the ravages of disease.

3. The destitution, want, and suffering, resulting from poverty, which operate so powerfully to increase mortality in all the lower walks of life.

If these are the true causes of this sad mortality, there is much reason to hope for the future. A favorable and progressive change has taken place, in respect to temperance and morality, in consequence of which, they are better able to guard against the exposures and privations to which they were formerly subjected. With these advantages in their favor, Time, the corrector of evils, will, in due season, provide them with the physical and mental developments, adapted to the changed condition of their being.

In the division of the island, between the Indians and the whites, the latter, as usual, obtained much the better portion. That belonging to the Indians, is bleak and exposed, the soil light, sandy, gravelly, and barren, and without wood for either fuel or fencing, yielding, as was well said by the commissioners in 1849, "a precarious subsistence to the most untiring industry." Their fuel is peat procured from meadows on the territory. What fencing they have, is of material procured from abroad, which is so expensive that little is used, and they are obliged to pasture their cattle in the tethering rope—a mode unknown to most of the population of the State. Were their dependence on farming alone, for a living, their case would indeed be a most hopeless one, unless they changed their location. The young men usually go to sea, or seek other employment, away from home, till they have obtained money enough to build them a comfortable house, so that they have a home, and then employ their time in fishing, or any other paying employment which they can obtain, and their land gives them work for any time that is not more profitably occupied.

Their immediate vicinity to such a place as Edgartown, gives the Chappequiddicks a great advantage over the members of any other of the plantation tribes, in furnishing them with many

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kinds of employment, and in the many comforts and conveniences of life, with which it familiarizes them, and brings within their reach. We consequently find them in a better condition, social and intellectual, than the other tribes. Morally, probably the inhabitants of Gay Head are at least their equals, and perhaps those of Herring Pond, also. The report of 1849 says: "Twenty years ago, they were preëminently a degraded people, unchaste, intemperate, and, by consequence, improvident; now, they are chaste, not a case of illegitimacy, so far as we could learn, existing among them; temperate, comparing, in this respect, most favorably with the same population, in the same condition of life, in any part of the State, and comfortable, not inferior in dress, manners, or intelligence, to their white neighbors." This picture, though rather strongly drawn, was substantially correct, and it is satisfactory to know that what was true of them in these respects at that time, is true now, and it is hoped that they have not become stationary, but are still progressive, though this cannot be affirmed with entire confidence.

Most of the residents have framed houses, and things in and about them have a neat and comfortable appearance, as much so as among their white neighbors; indicating, if not thrift, the absence, at least, of any pressing want. A large proportion of the proprietors have barns, with the usual farming tools, cattle, swine, &c. The number of horned cattle is thirty-four, swine eleven, and one horse; divided among eight families, as will be seen by the accompanying tabular list.

Under the law of 1828, the territory of this tribe has been divided, and in some cases subdivided among the inhabitants. In the original division, a certain quantity was assigned to each individual, including those of every age, but it was not set off to each, but the whole amount assigned to any one family was set off in one lot to the family, and the father held and occupied the same during the minority of the children, and usually during his lifetime, as, if divided up among the children it would not leave enough for the support of the parents, nor yet sufficient to make it any object for the children to settle upon it separately. Consequently the children have usually either retained their home with their parents, or sought means of subsistence and homes elsewhere, and left the land originally assigned to the family undivided. In the law, provision was made, that in the

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division, regard should be "had to the rules of birthright and descent, established among said Indians and people of color, and to those rights which individuals and families may have acquired by virtue of a possession and improvement;" yet it is singular that it established no rule for subsequent division and descent of the shares, nor did it indicate whether it should be according to Indian rules and usages, or according to the laws of the State. Disagreements and controversies have, of course, arisen in relation to this question; but, thus far, none which the guardian has not been able to settle, if not in all cases to the satisfaction of the parties, at least with their acquiescence. More serious difficulties may arise, but sufficient unto the day are the evils thereof, and perhaps it is not best to anticipate them by legislation, as it will be easier to provide a remedy, with an actual case, presenting the different points, than it would be in acting upon any supposed case.

Like all the other Indians of the State, who stand in the legal relation of Indians, those of Chappequiddick are disfranchised, with the exception of two families who reside on the other side of the line, in Edgartown, and own property there, for which they are taxed. The law of 1828, which, it will be recollected, applies only to Chappequiddick and Christiantown, establishes a sort of municipal organization among the inhabitants. The commissioners' report of 1849, says: "For municipal purposes, if the anomalous meetings which they are allowed by the Act to hold, are entitled to the name of municipal, they can vote, and choose certain officers; but, as citizens of the State and Union, they are totally disfranchised. They are required by the Act to meet in the month of March or April, at which meetings it is the duty of the guardian to preside; in case of his unavoidable absence, they may choose a moderator, and then they 'may choose a clerk, two overseers, constable, field-driver, pound-keeper, and other town officers.' 'It shall be the duty of said constable to carry into execution the laws of the Commonwealth, within the territory of said Indians and people of color.' It will be seen that the terms of the Act leave it optional with the Indians to choose these officers or not, as they may please. Usually, perhaps uniformly, they have gone through the process; but the officers are merely nominal, the legal condition of this people being so anomalous and so imper-

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fectly defined, that we believe that no attempt has ever been made to enforce municipal regulations. These meetings answer a good purpose, as affording an opportunity for mutual consultation and advice from their guardian; beyond this they cannot go. The rights of woman are fully recognized, the females taking the same liberty of speech, and, when unmarried, or in the absence of their husbands, enjoying the same right of voting with the men. They cannot sue or be sued, or be held to any contract without the consent of the guardian previously given; cannot receive wages for any voyage, if payment be forbidden by the guardian; may be sent to sea as 'habitual drunkards, vagabonds and idlers,' and the wages withheld by the guardian; and cannot, under any circumstances, alienate their lands, or any portion of them. These restrictions, particularly the latter, securing the 'inalienability of the homestead,' and others, too numerous to mention, may mostly be necessary; still, in the hands of a guardian, disposed to abuse such powers, they might become insupportably oppressive to the Indians."

The commissioners then refer to the third article of section fourth, relating to the power of guardians or justices of the peace, to punish the Indians in certain cases,—a notice of which will be found in this report in treating of the Gay Head tribe,—and characterize it as "atrocious." They say that though there is little danger that its provisions "will ever be abused, to the extent to which they are capable, still, they confer an irresponsible and summary exercise of power, which cannot safely be intrusted to any man. They were unnecessary at the time of their enactment, and have never, so far as we could learn, been enforced; and should no longer be allowed to deface our statute books, and disgrace the Commonwealth." The objectionable character of these provisions does not consist merely in the irresponsible and summary power which is conferred, and which might be abused, but as much in the singling out of the Indians, and making them the special subjects of cruel and unusual penal enactments, to which no other class of our population is subjected for the same offences. It is on this point that they are most sensitive, and they seem to consider it as but another manifestation of the same feeling, which has subjected them to civil proscription and social degradation.

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Since the report of 1849, the provisions of the laws of 1829, providing for making and maintaining the divisional fence between the Indian proprietors and their white neighbors, which were then in abeyance, have been carried into effect. A substantial fence has been built on the north side of the highway which runs between the Indian and white proprietors. This disposes satisfactorily of another cause of complaint by the Indians; that, where a shorter cut could be made, by leaving the highway and travelling, with cattle and carriages across their cultivated lands, the white inhabitants did not hesitate to do it, and the Indians were thus subjected, in some instances to serious inconvenience and loss. The settlement of every question of this kind, is a cause of felicitation, as doing away with one of the causes of irritation, to those who feel as if they were the subjects of oppression and wrong, without the means of protecting themselves in the enjoyment of their rights.

The Chappequiddicks have no religious organization, nor have they any religious services or instruction, distinct from their white neighbors. They attend meeting at the "Marine Church" at Sampson's Hill, across the line, whenever there are services there, which is at irregular intervals. They manifest a disposition for religious instruction and improvement, and would doubtless be punctual in their attendance, if they had any constant meeting of easy access. They receive one hundred dollars a year from the school fund,* which gives them about five months' schooling. The average attendance the past season was twelve, which, considering that there are but sixteen children of Indian descent, between the ages of four and sixteen, on the Island, is a very good proportion, indicating a very commendable interest on the part of the parents, in the education of their offspring. The amount of schooling is considerably abridged by the necessity of purchasing fuel, there being no wood on the plantation. It is unfortunate that this school, and those of the other tribes, make no part of the great school system of the State, that they are isolated and cut off from the

* The special grant of $104 a year from the school fund, to be equally divided between the Chappequiddick and Christiantown tribes, which was made in 1856, expires in 1861. The Commissioner believes that the policy which dictated the grant was wise, as well as beneficent, and he cannot too earnestly recommend its renewal and continuance.

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rest, and cannot, therefore, be expected to make the progress which system, combined effort, emulation, and vigilant and enlightened superintendence impart to our common schools. Where it is practicable, it would be far better to bring the children into the adjacent district schools, the Indians and whites paying according to the number of scholars furnished by each respectively, or uniting on such other just and liberal basis, as might be agreed upon. It is believed it might be a mutual advantage to both classes, as the same money would give more schooling, combined in one reasonable sized school, than divided between two small ones; it would create a mutual and beneficial emulation, and, by bringing the children together, mitigate, if not remove, the mutual prejudices which more or less prevail.

The tribe has no source of public revenue for any purpose whatever. Individually, although many of them have stock or other personal property in possession, most of them owe more or less for it, and it is believed that, if their debts were paid, very few would have as much left as the law exempts from attachment. There are at present no paupers among them, recognized as such, except one aged man,* a foreigner, who has been entirely blind for a long time, and for the last two or three months he has been quite sick. The State pays fifty dollars a year towards his support, a sum quite inadequate to meet the expense, under existing circumstances. There are among them four aged widows, some of them with families, and all of them feeble, and able to do but little for a living. Their lands, those that have any, naturally poor, are worn out and exhausted, and if this people were not, in the language of their former guardian, Hon. Leavitt Thaxter, "kind and considerate to each other, in health and in sickness," some of them, at least, would find it hard to get a living without public aid. They shrink instinctively from the idea of pauperism, and will do almost any thing for themselves and for each other, rather than be placed in that predicament. A striking instance of this has occurred in the case of one of these aged widows, Mrs. Eleanor Joseph, familiarly known as "Aunt Nelly," now well advanced in her eighty-fourth year. Though in low circumstances

* Since deceased. The term foreigner is used here and elsewhere to designate one not an Indian.

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herself, she has boarded and nursed one aged sister, who was entirely destitute, to the value of more than three hundred dollars, up to the time of her death, without any assurance of compensation from any quarter. She also attended upon and assisted another aged and sick sister, without compensation, to the value of near forty dollars. She is now needy herself, and has no one to do by her as she has done by her sisters. The Commissioner was informed that application would be made on her behalf, to the legislature, for compensation for the services rendered her sisters. Should that be the case, the Commissioner believes from information derived from reliable sources, that the application is one that commends itself to the justice of the State, and presents a much stronger claim than some others, which, within his own knowledge, have been granted. Should this act of justice be done her, it will give her present relief, and, very probably, render her descent to the grave free from further pecuniary trouble.*

The attention of the Commissioner was directed, particularly at this place, to the question of the enfranchisement of the Indians, and placing them on the same footing as other citizens,

* The State has paid but very little for this tribe as compared with some others. It will be borne in mind that Wm. Johnson, toward whose support the State has annually contributed $50, as already stated, is a State pauper; and, so far from the payment being a gratuity to the tribe, it does not probably amount to a moiety of the actual expense of his support. But the old man had been the husband of one of their women, and so the tribe, to prevent his being subjected to the sundering of the ties which bound him to them, generously contributed the additional sum necessary for his support, and thus averted the necessity of his removal to the State asylum. Excluding this, and also the money received from the school fund and their portion of the surplus revenue, for their school, the payments from the treasury on their account, for seven years, to 1859, inclusive, were as follows:—

1853, Sept. 1. For board and burial expenses of Jane Saunders, an aged woman,	$48 21
1855. Paid Abraham Brown for board and funeral charges of Nabby Latham, an aged woman, the mother of over twenty children,	40 50
1857, Feb. 20. For the repairs and painting of the school and meeting-house,	100 00
1858, April 9. For board and funeral charges of Margaret Peters, an aged maiden woman, who died of cancer,	69 00
Total, in seven years,	$257 71

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inasmuch as their state of advancement, socially, morally, and intellectually, together with their more favorable situation for acquiring a living, gives them an advantage for assuming the responsibilities of this position, over any other of the tribes. On his first visit, two of the men, one of them a man of good ability and considerable intelligence, were very decided and earnest in favor of the immediate consummation of this object. They urged upon his consideration the disabilities under which they suffer; that they can make no contract that is binding without the consent of the guardian; that, having property in their possession, they cannot pledge it to raise money, with which to make improvements, if desired; and other difficulties which embarrass and discourage them, in their present condition; and expressed a decided wish to have the disabilities promptly removed. They appeared to speak, however, chiefly in reference to their own particular cases, feeling a confidence in their own ability to manage their affairs, and to meet successfully the new responsibilities under which they would be placed. They expressed no opinion, however, of the effect which such a change might produce on the general interests of the tribe. They held that equal privileges were the natural right of all, and they did not choose to be deprived of them. On the other hand, older members of the tribe, thoughtful, considerate, and prudent persons, were equally decided in the opinion that no change ought, at present, to be made. They believed, if it were made, it would operate disastrously on the tribe; that most of them would soon become the prey of shrewder and sharper men outside, that the little property they possess would be wrested from them, and that they would be turned out, destitute, upon the cold charities of the world. The community would be consequently broken up, and scattered among those who would have no particular sympathy with them, and who would not render them the aid which they now receive, in time of trial and of need. Such change should not be sudden. The generation on whom the new responsibilities were to rest, should grow up with them in view, and with the knowledge that they must be prepared to meet them. For themselves, although feeling sensibly the evils to which they are subjected, they would rather submit patiently to them, than in their efforts for relief, to encounter new ones, to which they

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are unaccustomed, and which, consequently, they do not know so well how to meet and overcome. Such was said to be the general feeling of the tribe; and on the last visit of the Commissioner, he was assured that the individual who, at first, was most earnest for a change, on taking a more enlarged and comprehensive view of the matter, was satisfied that it was best the change should not be made, being quite willing to forego his own individual feelings and preference, for what he believed to be best for the tribe.

With the conclusion to which the Indians themselves have arrived on this question, the Commissioner fully concurs, believing that for a while at least, it is best that the protection which the law now throws around them, should be continued to this tribe, and that whenever a change is made, it should be done prospectively, giving the Indians ample time to prepare for it.

CHRISTIANTOWN INDIANS.

The little village of Christiantown is situated in the group of hills which skirt the shores of the Vineyard Sound on the north-west side of Martha's Vineyard, and in the town of Tisbury. The whole number of inhabitants belonging to the tribe is fifty-three, as follows:—

Number of families,		14
Males,	23	
Females,	30	
	—	53
Natives,		53
Foreigners,		0
Under 5 years of age,		7
From 5 to 10 years of age,		5
10 to 21 years of age,		10
21 to 50 years of age,		24
50 to 70 years of age,		5
Over 70 years of age,		2

The two over 70, are aged 71 and 83 years, respectively. The number of the tribe in 1828 is said to have been forty-eight.

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The number reported by the commissioners in 1849 was forty-nine. As there are fifty-three now, there would appear to have been a gain in numbers since 1849, but such is not the fact. Two families were somehow omitted in the enumeration then, and there have been but two or three additions by marriage from other tribes. The mortality here has been unaccountably large during the last eleven years, exceeding that of any other tribe. Of the forty-eight persons whose names were returned by the former commissioners, sixteen, or just one-third of the whole, have died! During the same period there have been thirteen births, so that the deaths have exceeded the births by three, although the number of births has been large, in proportion to population. Of these births five have been in one family and four in another. In one family, there has been a most remarkable mortality. When the commissioners visited the plantation in 1848 there was a widow named Weeks, aged 60, with four sons and two daughters, whose ages varied from 22 to 40, and at the corresponding period of the year, in 1859, every member of the family was dead, and there was not a person of the name left on the plantation! In another family consisting, in 1848, of a father aged 37, and three children, the father and two of the children were dead in 1859.

The territory of the tribe, containing about three hundred and ninety acres, was divided under the law of 1828, with the exception of a lot of about ten acres, called the common. This common lot is a good pasture, and formerly yielded considerable revenue (of which it is the only source held by the tribe) but for the last seven years, the gross amount received from it does not exceed twenty dollars. The land is hilly and stony, yielding an abundance of material for wall, with which the lots are mostly fenced. The soil is rough and hard, but much better in quality than that at Chappequiddick, and is capable, with patient toil and skilful culture, of being made quite productive; but here, as elsewhere among the tribes, the culture seems to have been managed with reference to getting a present crop at the least expense, rather than to the permanent improvement of the soil. The land is consequently much worn out and exhausted, and requires capital, labor, and skill to renovate it. Although agriculture is the leading employment of a large number of the inhabitants, it is not relied on solely

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for a living, but the people here, as at Chappequiddick, seek other employments as a means of obtaining their necessary supplies, whenever the state of their farm work will allow; and, in many cases, it is apprehended, they take other employment whenever it offers, without reference to the necessity of work on their farms. This necessity for procuring such articles as the farm does not supply, is one principal cause of the deterioration of their cultivated grounds. The young men nearly all go to sea, to obtain the money necessary to give them a start in the world. The past season, a young married man returned early in the spring from a successful whaling voyage. The proceeds of his share built him a neat and comfortable house, which was ready for occupancy in the summer, procured the necessary furniture, and left him forty dollars in pocket. While such results occur, though they may be but occasional, the chance of success offers too great a temptation to be resisted, as compared with the very moderate accumulations to be expected under the most favorable circumstances, from farming labor. The Indians are much sought, as seamen, on board the whaling ships, and can, generally, if smart, have the situation of boat-steerer—an important position, and one which draws an extra share in the proceeds of the voyage. A large ship owner in the whaling fleet remarked that an Indian would always draw a larger share than another man of like general qualifications, in whatever situation he was placed; and an old whaling captain said that an Indian would see a whale further than any other person, and, as a boat-steerer he was more sure to capture it, than any others. It is not strange, therefore, that so many of the young men are induced to resort to this mode of employment, during the most active portion of their lives; nor would it be regretted, but for the habits it is too apt to induce, which are unfavorable to the patient, persevering, unremitting toil, necessary to success in agricultural pursuits in after life, and to the economy and thrift so desirable in families and communities.

The people at Christiantown are, most of them, comfortably housed, and, in the arrangements of their household, modes of living, and domestic comforts and conveniences, are much like those of Gay Head. In these respects as well as in refinement and general intelligence, they fall below those of Chappequiddick, whose proximity to Edgartown gives them an advan-

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tage in the facilities of acquiring a living, and of improvement by social intercourse, which has made a marked difference in the condition of the two tribes. It has been said that this isolation of the Christiantown tribe "is not without its advantages, as the temptations to unchastity and intemperance are less." If this is so, it is much to be feared that they have not properly improved the advantages of their position, for, although there may not be more intemperance in proportion to numbers, than at Chappequiddick, or Gay Head, yet, in general morality, there is good reason to fear that they fall decidedly below either of those tribes.*

In their general character and conduct these Indians are quiet and peaceable, but disputes arise with each other, and occasionally with their white neighbors, giving rise to contention, and sometimes to litigation, though the guardian has been able, except in one instance, to settle these differences without having the courts troubled with them.

For some years past this tribe has had no regular stated public worship. Occasionally they employ a preacher for eight or ten Sabbaths in succession, but most of the time they have none. When they are destitute, those who feel so disposed have the opportunity of attending public worship with the whites at Middletown, about two miles distant, an opportunity which is not improved so much as would be best, and for obvious reasons, it is not to be expected that it should be. Had they meetings of their own, where there would be something like an equality of condition among those who attended, and where they would not feel that they were looked upon by most of those present as a proscribed race, there is no reason to believe that their attendance would not be as good as that of the community in general among whom they reside, or elsewhere.

The amount expended for schools here, is $100 a year, the same as at Chappequiddick. It is partly drawn from the school fund, and is made up, the remainder, from the interest

*As corroborative of this, it may be stated, that, since the foregoing was written, and during the year 1860, although there were but five females unmarried over the age of 16, in the tribe, there were three cases of bastardy, and one other birth, which occurred in about eight hours after the marriage of the mother.

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of the portion of the surplus revenue set apart by the State for their benefit. This gives them about five and a half months' schooling in the year, the last two terms having been two months in the winter, and three and a half months in the summer. There are only about fifteen minors on the plantation, of age suitable to attend school, and of these, two or three of the girls, whose parents are very poor, have been obliged to be out at service to obtain suitable clothing for themselves, so that the school is of no benefit to them. The average attendance, the last season, has not been more than from eight to ten scholars.

There are none here now that are considered paupers, and there is no appropriation from the State for any such purpose for this tribe. The municipal organization here is the same as that at Chappequiddick, under the law of 1828, as already detailed, and the two tribes are under the same guardian, B. C. Marchant, Esq., of Edgartown, who has held the office for about seven years past, and who appears to have discharged its duties with a good degree of success. The people appear to prefer their present political position to any change that would be likely to be made, and are not so well prepared for a change as some others would be; the remarks therefore, on that subject in relation to Chappequiddick, have still more force as applied to this tribe; and the withdrawal of the care and guardianship which has hitherto been extended to them, it is believed, would be consonant neither with justice, the wishes of the inhabitants, their best interest, or a wise and humane policy on the part of the State.

GAY HEAD TRIBE.

The western end of Martha's Vineyard is divided into three peninsulas, Nashaquitsa, Squipnocket, and Gay Head. They are nearly cut off from the main land of the Island by Menemsha Pond which comes in from the north by a narrow strait, so shallow as to be easily fordable at low-water, and extends across to within a few rods of the south side, leaving an isthmus over which passes the highway to Nashaquitsa, and thence to Gay Head. Nashaquitsa connects with Gay Head by another

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narrow isthmus, which has Menemsha Pond on the north-east, and Squipnocket Pond on the south-west, the latter pond bounding Gay Head on its south-east side, and dividing both Gay Head and Squipnocket from Nashaquitsa, except by another narrow neck, which connects them at the eastern extremity of Squipnocket. Gay Head is of nearly equal length and breadth, the outline somewhat irregular, between a circle and a square in form, and contains, within its area, about two thousand four hundred acres of land. About four hundred and fifty acres of the land is held in severalty, and is fenced and occupied by the several owners, and the remainder is held by the tribe in common.

In this tribe, unlike some of the others, the population appears to be gradually increasing, and the increase would be more apparent, but for the emigration which has taken place, in search of more profitable sources of employment, and easier means of living, than are afforded by the isolated situation of the plantation, and its consequent limited choice of pursuits. The whole population of the plantation, including a few in the vicinity, who are recognized as having rights as members of the tribe is two hundred and four, viz. :—

Families,		46
Males,	106	
Females,	98	
	—	204
Natives,		194
Foreigners,		10
Under 5 years of age,	15	
From 5 to 10 years of age,	23	
10 to 21 "	61	
21 to 50 "	69	
50 to 70 "	29	
Of 70 and over, "	7	
	—	204

Those of 70 years of age and over, are respectively of the ages of 70, 75, 76, 76, 77, 80, and 86 years. The births in the last eleven years have exceeded the deaths by about twelve. There are a considerable number in addition to the foregoing,

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who have left the plantation, either temporarily or permanently, who nevertheless claim to belong to the tribe, together with the families of such as have them. The number of these could not be ascertained. The names of such as were reported to the Commissioner—chiefly by themselves, or, as it was understood—by their request, are arranged in a separate or supplementary table. It should be remarked, however, that, although these went from Gay Head or are the descendants of those who did, they are not recognized by those residing there, as having retained any rights, as members of the tribe. Of those included in this supplementary list, the whole number is forty-nine.

Families,		8
Males,	22	
Females,	27	
Unknown,	0	
	—	49
Foreigners,		5
Under 5 years of age,	4	
From 5 to 10 years of age,	6	
10 to 21 " "	16	
21 to 50 " "	15	
50 to 70 " "	0	
Unknown,	8	
	—	49

Making in the whole, 253, of whom 128 are males and 125 females.*

* Combining the whole, we have the following result, viz. :—

Whole number,	253
Families,	54
Males,	128
Females,	125
Natives,	237
Foreigners,	16
Under 5 years of age,	19
From 5 to 10 years of age,	29
10 to 21 "	77
21 to 50 "	84
50 to 70 "	29
Of 70 and over, "	7
Unascertained,	8

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Twelve of those classed as natives in the first list were born on the other plantations, but, by the Indian rule, by intermarrying at Gay Head, have acquired all the rights of natives. This rule applies only to such as belong to the other plantations, and to such as the tribe may think it to their own advantage to concede the right to. They are very cautious in the concession of this right, as they are jealous of the influence of foreigners, having had much trouble with some of those who have intermarried with their women and settled amongst them.

The surface of Gay Head is uneven and somewhat hilly, with a great variety of soil, some of it of excellent quality, affording fine pasturage for cattle, and this constitutes almost the sole resource of the tribe for revenue to support their poor. Cattle are brought hither from other parts of the Vineyard, and from the main, for pasturage, and the income therefrom is paid into the public treasury. It amounts to about $225 a year, and is wholly applied to the relief of the poor. The only other sources of income, are, from their cranberry bogs and their clay. These are both public property. The cranberries are not allowed to be touched till a given day, when, after previous notice, the picking is to commence. Then, all go to work, each one gathering according to his ability, till the crop is exhausted, and retaining to his own use and profit, whatever he may gather. The annual value varies much, according to the season and the price, ranging probably from one hundred dollars to three hundred a year.

The clay is the plastic variety, used extensively for making alum and some other manufacturing purposes, and is found no where else in New England, except on the Vineyard. When a vessel comes for a cargo, notice is given, and men, women, and children over a certain age, all have a right to go and assist in the loading, and, when the work is complete, each receives an equitable share of the pay, according to the time he has labored and his ability to perform. Formerly, this was a source of considerable individual revenue, as the amount received for the clay, when on board, would average somewhat better wages than could be earned by the people at any other obtainable employment. But, recently, this source of income has become almost entirely unproductive. There are beds of clay, of the same kind, in the adjoining town of Chilmark, the propri-

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etors of which are able to deliver it on board vessels, at a price, which will not yield to the people of Gay Head, ordinary day wages. In consequence of this, they have almost entirely monopolized the business, and the sales at Gay Head have nearly ceased.

The land is generally rough, affording abundance of stone for fencing, and a considerable portion of what is not taken up and enclosed, or is not used for pasturage, is grown up to bushes, which afford convenient summer fuel for common culinary purposes. Any member of the tribe may take up, fence in, and improve as much of this land as he pleases, and, when enclosed, it becomes his own. The benefit to the plantation of having more land subdued and brought into cultivation, is considered a fair equivalent for its value in the natural state, and the title to land, so taken up and enclosed, is never called in question. How long this state of things may continue, and no difficulty grow out of it, is not easy to be foreseen, and will depend upon some contingency, which shall bring rival interests in collision. To outsiders it seems strange that such a community should live together in peace, from generation to generation, holding real estate in common and in severalty, yet without any recorded title of that held in severalty, or any written law regulating its transfer or descent. Yet it is no more remarkable than the whole civil polity of the tribe, by which a community residing in the State, and nominally of the State, and subject to its laws, is yet a sort of *imperium in imperio*, not governed by the laws to which it is nominally subject, but having its own independent law, by which all its internal affairs are regulated. This law is the unwritten Indian traditional law, which, from its apparently favorable working, is probably as well adapted to their condition and circumstances as any that can be devised. At any rate, they adhere to it with great tenacity, and are fearful of any innovations upon it. This, probably, is a prominent reason of their jealousy of foreigners, and of the rigorous exclusion of them from any foothold on their domain, except when intermarried with one of the tribe. The rule, to "let well enough alone," is perhaps the true one to adopt in this case, and it is believed that no advantage will accrue, either to the Indians or the State, by any change or modification of the system, till some contingency shall arise that imperiously demands

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it, and then it should be done only with a thorough understanding of the subject in all its bearings and relations, and with a knowledge of the system and its operation, and of the rights acquired under it, and of those which will be affected or acquired by a change,—an understanding which no man living now possesses.

The people of Gay Head, like those of the other plantations, are a mixture of the red, white, and black races. They have, also, an infusion of the blood of the chivalry of the South, as well as of the Portuguese and Dutch, as might be inferred from the names of Randolph, Madison, Corsa, Sylvia, and Vanderhoop being found among them. Nearly all their young men, heretofore, have gone to sea, and many of them never return; some dying at sea, and others finding new homes in distant lands. The places of these are supplied by others, chiefly sailors, from abroad, who, getting acquainted with the Gay Head men at sea, come here, and marry Gay Head women, and settle here for life. By this continual efflux of native males, and influx of foreign males, the Indian names have almost become extinct, and but for two or three families, a list of their names would never suggest an idea of their aboriginal origin. The admixture is much like that on the other plantations, with, perhaps, a less infusion of the African than in some of them. A few are so strongly marked with the Indian characteristics, as to induce the belief that they are very nearly of pure blood; but there are none so nearly white, as in some of the other tribes.

The Gay Headers are, in the main, a frugal, industrious, temperate, and moral people; but not without exceptions. In these respects they have greatly improved within the last thirty years, and particularly within the last ten or twelve years, so that, it is believed, they will bear a favorable comparison with any of the other tribes. They have made great efforts to promote the cause of temperance and of general morality, in which the mass of the population have united; but a few individuals have stood aloof and thrown their influence against these desirable reforms. They are generally kind and considerate toward each other, and perform their social and relative duties as well as do the other people in whose vicinity they reside. It is a somewhat remarkable fact, that, of less than two hundred per-

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sons, who live on the plantation, over sixty, or about one-third of the whole number, are communicants of the church, and many of them adorn their Christian profession by the purity of their lives and conversation.

It has already been stated that Gay Head is a peninsula. Across the narrow isthmus which connects it to the main island, passes the boundary between the Indians and the whites, and a substantial stone wall is built upon the dividing line, except, where the road passes, bars are placed, and these have to be removed whenever a carriage crosses the line. Thus surrounded by the sea, except at this one point of ingress and egress, situated at a distance from the main or any other land, except the small island of "No-man's-land," about three miles distant, they are almost isolated from the rest of the world. This comparative isolation has both its advantages and its disadvantages. While it removes them from direct contact with the vices of the outside community, the concomitants of civilization, it cuts them off from most of the comforts, conveniences, and enjoyments peculiar to refined society, and a more perfectly developed social state. It subjects them to loss of time, and to expenses which bear heavily on them, and trench severely on their limited means. For their blacksmithing and various other kinds of mechanical work, for their physician, drugs, store supplies, &c., they are compelled to go from seven to fifteen miles, and every grist of grain that they have ground, must be carried ten miles to mill, and then, if it cannot be ground at the time, they must make another journey to get it. This isolation also deprives them of the opportunities for profitable employment, and debars them from most of the ordinary means of making money and acquiring property; so that most of them are kept more or less in debt, notwithstanding their frugal habits and self-deprivations; and many of them find it difficult to procure money sufficient to supply themselves with such things as are considered absolute necessities in the most humble household. For want of the necessary capital, they are not in a condition to bring new land into cultivation, to procure labor-saving machinery, or to avail themselves of the improved systems of husbandry, which prevail elsewhere.

Laboring, as they do, under these difficulties and discouragements, we could hardly look for much improvement in the con-

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dition of the tribe. Yet it is an unquestioned fact, that they have, in reality, made more progress, during the last ten or twenty years, than any other tribe in the State. Twenty or thirty years since, a considerable portion of them lived in wigwams. The commissioners under the Resolve of the legislature, passed May 10th, 1848, in their report, dated February 21, 1849, speaking of this tribe, say: "Generally, they live in framed houses, perhaps a majority having barns." "*A number of their families live in huts or hovels*, some few in squalid poverty." At the present time, they all live in frame or stone houses, most of them comfortable ones, and every inhabited house on the plantation *has been built within twenty years past.* These, however, have not been built from their home resources, but generally at the sacrifice of the best portion of the men's lives on the ocean. Nearly every man on the Head has spent a greater or less portion of his life at sea, usually at whaling. They commence young, frequently before getting the schooling necessary for business; and those who are successful, when they have accumulated enough to build a house, return and settle down; while those who are not, usually continue seamen through life, or find a new home abroad. This necessity of spending so much of their lives at sea, and the casualties contingent thereon, are among the prominent causes why the population of this and the other tribes is so nearly stationary, or, in some of them, retrograde.

Some of the evils to which the tribe is subjected, in consequence of the straitened pecuniary condition of most of its members, present a claim on the State for relief, which good policy and humanity would seem alike to demand, should not be ignored. The report of the commissioners in 1849, already referred to, in speaking of this tribe, says: "Applications for assistance from the State are rarely made. For the last six years only ninety dollars and thirty-seven cents have been appropriated by the State for all purposes. Some years since an appropriation was made by the State for the erection of a wind-mill, and the result has been of *singular benefit to the tribe*. They are now relieved from the necessity of going to Chilmark to mill, and thus saved from frequent *exposure to temptations to intemperance and extravagance.*" In a tornado which swept over the Head, a few years since, the mill was

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totally demolished, and the inhabitants were thus deprived of a longer enjoyment of the blessing which it had conferred on them. Having no means of their own for rebuilding it, and being unwilling again to ask the State for aid, they have quietly and patiently submitted to the deprivation, and would not, of their own accord, bring the subject to the notice of the legislature.

The people have, in former times, suffered so much from outward interference in their affairs, that they have become very fearful of it, and for that reason are always indisposed to make any want known to the legislature, lest it should be made the occasion of such interference as would be unwelcome to them. During the whole intercourse of the commissioner with them, no suggestion was made by any individual of a desire for an appropriation of any kind for their benefit; and when, after their great need of a mill had been pressed upon his attention from other quarters, he inquired of one of their leading men concerning it, he mildly replied that a mill would indeed be a great benefit to them, and was very desirable, but they did not think of asking the State for one.

Another most urgent need is of suitable and sufficient books and stationery for the children at school. These cannot be had without ready money, and a large portion of the residents find it as much as they can do, to provide clothing such as will make their children appear decent at school, and it is believed that much of the benefit which might be derived from the schooling is lost, for the want of such books and stationery as are necessary for the use of the scholars. This waste of time and loss of opportunity for education, should not be permitted by the State, to one of the most unfortunate classes of her population. In view of the improvement they have made, under such adverse circumstances, and of the disposition they have manifested for bettering their condition, it is but reasonable to believe, that the proposed assistance would afford at once an opportunity and a stimulus for further progress in the right direction.

Such improvements have been made, of late years, in the construction both of wind-mills and of mills for grinding grain, as to make both better adapted to such a case as the present, and it is believed that an appropriation of dollars

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would purchase those of sufficient size, to erect a suitable building for their accommodation, and to put them in operation. And it is believed that an appropriation of fifty dollars per annum, to be applied to the purchase of school-books, stationery, and apparatus, for the school at Gay Head, would meet the necessities of the case. Such appropriations would, unquestionably, be most gratefully received, and the backwardness of the Indians to ask for them, is an argument in their favor, rather than against them. Of all the noble charities of the State, by which suffering is removed or alleviated, or by which the condition of the unfortunate is improved, none, it is believed, present stronger claims on the representatives of an enlightened people, or will yield a more adequate return, according to the amount expended, than those now recommended; and the Commissioner cannot but express the most earnest hope for the success of the recommendation.

The inhabitants of Gay Head, like all others in the State, whose legal condition as Indians is recognized, are the involuntary wards of the State. It has taken their property into its own keeping, so far as any transfer of it is concerned—they can make no sale of their land or improvements to any but other members of the tribe, and as all of them have as much or more than they have means of improving, there are no purchasers. They can make no contract that is binding in law, and can neither sue nor be sued in the courts. They are therefore tied to the plantation by the act of the State, with all its disadvantages and their own disabilities, or if they leave it, it must be at the sacrifice and loss of the income of all their rights there. Such is the legal relation of the individuals of the tribe to the State. That of the tribe, as a tribe, is thus spoken of by the commissioners in 1849.

"The legal condition of this tribe is singularly anomalous. By the Act of June 25, 1811, the governor was authorized to appoint 'three proper persons to be guardians to the Indian, mulatto, and negro proprietors of Gay Head,' which guardians, in addition to the usual powers given to guardians in such cases, were empowered to take into their possession, the lands of said Indians, &c., and allot to the several Indians, &c., such part of said lands as should be sufficient for their improvement, from time to time; and the Act further provides for the

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discontinuance or removal of the guardians, at the discretion of the governor and council. Under this Act three guardians were appointed, and in 1814, a new appointment was made; since that time, no new appointment has been made. The Indians became dissatisfied with their guardians, who resigned, and the guardianship has disappeared. The Act of 1828 provided, that whenever the Indians and people of color at Gay Head, shall by a vote in town meeting, accept this Act, and shall transmit to his excellency the governor, an attested copy of said vote, then his excellency may authorize said guardian to act as guardian, &c., at Gay Head, and may upon their request, appoint suitable persons to divide their lands. The Indians, cherishing no very favorable recollections of the guardian-system, have never accepted the Act. For about thirty years they have been without any guardian, and the division of their lands, and indeed the whole arrangement of their affairs, except of the school-money, have been left to themselves."

To this day they never have accepted the Act, and probably never will. Had they accepted it, they would have been placed in the relation of minor children, under 14 years of age, who have not the right to choose their own guardian. As it is, they are the direct wards of the State, without the intervention of a guardian, and as such it would seem that the State is bound to protect them in all their interests with paternal solicitude.

The provision for the appointment of a guardian was not the only objectionable feature of the Act of 1828. The guardian was empowered "to punish, by fine not exceeding twenty dollars, or by solitary imprisonment not exceeding twenty days, any trespasses, batteries, larcenies under five dollars, gross lewdness and lascivious behavior, and disorderly and riotous conduct, and for the sale of spirituous liquors within the territory, or on the lands of said Indians and people of color; and said guardian or other justice of the peace may issue his warrant directed to the constable of said Indians and people of color, or other proper officer, to arrest and bring before him, any offender against the provisions of this Act; and after judgment, he may order execution to be done by said constable or other proper officer; and if said guardian or other justice of the peace shall adjudge any offender to solitary

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imprisonment, such offender *shall not, during the term of said imprisonment, be visited by, or allowed to speak with any person* other than the jailer, or said guardian or justice of the peace, or such other person as said guardian or justice of the peace shall specially authorize thereto; *nor shall such offender be allowed any food or drink other than coarse bread and water*, unless sickness shall, in the opinion of a physician, render other sustenance necessary." With such a provision in the Act, making a discrimination so odious and unjust, between themselves and other prisoners, the Indians would have been greatly wanting in self-respect had they accepted it. It is a provision disgraceful to the statute book of the State, and discreditable to the civilization of the age. Yet two tribes, the Chappequiddick and the Christiantown, were made subject to the provisions of this law, without the power to accept or reject it, and are governed by it to this day.

The municipal organization consists, mainly, of three overseers, a clerk, treasurer, school committee, and committee on public lands, and by these their municipal affairs are regulated and managed. The school committee performs the duties incident to such committees in the towns, and those of prudential committee also. The school is kept, usually, about seven months in the year, and is well attended, but its value is greatly impaired by the inability of the parents to procure suitable books, stationery, &c., as already spoken of. The same want was noticed by the former commissioners, in their report in 1849. May we not hope it will soon be remedied.*

The religious organization, here, is that of a Baptist church, belonging to the Barnstable Association, to which it sends delegates. The society for propagating the gospel among the Indians contributes, annually, two hundred dollars for the

* During my visits to Gay Head and my correspondence with members of the tribe, the only appropriation of money for their benefit that was suggested by any one of them, or about which they appeared to be particularly solicitous, was one to enable them to secure the services of a minister a greater portion of the time than they are now able to have one. They seemed to consider the want of this as their greatest deprivation. It is to be hoped that some missionary or other religious association, especially of the denomination to which this tribe is attached, may extend to them the desired aid. They could hardly find a more promising missionary field according to the expenditure required.

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support of the ministry, and the inhabitants contribute, in labor and otherwise, about seventy dollars more, for the same purpose. They have, also, a very comfortable parsonage, which is occupied by the minister, when they have one. When they have none, they hold frequent meetings, at which they exhort and pray. They appreciate and improve their religious privileges, and manifest a regard for their religious duties and a sincerity in the performance of them, more general than has been observed in any other tribe.

The support of the poor, at Gay Head, is a very severe tax upon the people, absorbing the entire revenue of the public lands, which is the largest, best, and most valuable portion of the property of the tribe, including that belonging to individuals as well as to the public. There are four paupers at the present time, for the support of one of whom, alone, about two thousand five hundred dollars has been paid. One of the others is a foreigner, toward whose support the State pays fifty-two dollars per annum. Another of them is partially insane, and has been in the insane hospital at Taunton, but has been removed to the almshouse at Bridgewater. Others receive partial and occasional relief, as their condition and circumstances require.

It seems fortunate, in every point of view, that the Act of 1828 was not accepted by the tribe. That Act made provision for the division of the public lands, a measure which has proved disastrous to the interests of the Marshpee tribe, and which would, unquestionably, have proved equally injurious, had it been carried out at Gay Head. It would have taken from the tribe its only source of public revenue that can be permanently relied upon, while a considerable number of those to whom it would have been distributed, never would have realized from the land, the means of paying their proportions of the support of the poor and other public expenses. The effect of it would also have been, probably, to concentrate in a few families, nearly all of this domain. In the natural course of things, some families multiply rapidly, while others remain stationary, or run out, and become extinct. This has been remarkably the case among the Indians, and we find, on the one hand, single families, the sole representatives of numerous families a few generations back, and on the other, where one family, a hundred years since, has now numerous families of descendants,

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so that, while in one case the patrimony of numerous families would be concentrated in one, in the other, that of only one family would be subdivided among many. An inequality would also grow up, as it does in other communities, in consequence of the greater shrewdness and business capacity which some individuals possess over their associates.

As this question of the division of the lands has been, more than once, agitated, and may be again, it may not be amiss to inquire, why a division should be made. What is to be gained by it? The legal condition of the inhabitants should be considered. The State has declared them incompetent to take care of their own, to be mere children—of a larger growth, it is true—but incapable even of choosing their own guardian. It has, in conjunction with the popular opinion which rules with the law-making power, placed them in such a position and surrounded them with such circumstances, that the process of development, which shall qualify them to take their position as citizens, in the general community, with all the responsibilities and liabilities of that state, must necessarily be a slow one, requiring much time. Till the time arrives when that may safely be done, it is not perceived what better arrangement could well be made, in relation to the territory of the tribe than the one which now exists. If any man wishes for more land than he has, he has only to go upon the public domain and select what he wants, wherever he chooses, and fence it in, and it then becomes his own. If he will not do so much as this, for the sake of the land he wants, why should he have it? And, if he cannot do this, what would he do with a still larger tract, in case of division, which could be enjoyed in severalty, only by being fenced off? By the present system every young man, whenever he becomes of age, or whenever he is in a situation to need land, may take it up and occupy it. Thus an equality of rights and of possessions is kept up, which is most desirable in such a community as this. But, let the public domain be divided, and the sources of public revenue be dried up, the land having, a portion of it, passed into the hands of the improvident and thriftless, and more still, perhaps, into the hands of those who would prefer living abroad, and thus avoiding the public burdens, and it would not be long before the State would be obliged to provide for the poor, or the burden

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of it would fall with great severity on a small portion of the tribe.

All the reasons against a division of the territory apply with still greater force against changing the present relations of the tribe toward the State, and making them citizens. Indeed, if there has been a time, when that experiment should not be made, it would seem to be the present, so far as this tribe is concerned. They have been so long accustomed to a state of pupilage, that they are not prepared for the change; yet the steady progress that they have made for twenty years past, gives the encouraging hope, that, with the fostering care and encouragement of the State, the time may not be very remote, when the initiatory steps may be taken, for consummating that change. At any rate, while they are improving, there can be no reason for a change, unless they desire it, as it would, very certainly, involve them in difficulties and embarrassments, and bring additional burdens on the State. At the time of the public hearing, the expression of opinion was strong and decided against a change, all the most intelligent and respectable portion of the residents concurring therein, and it was understood that none desired a change, except a very few, whose bad character and vicious habits have rendered them a nuisance to the place. I may add, that all the friends of the Indians, and all those who are best acquainted with the circumstances of the case, so far as I could learn, most decidedly concur in the belief that the present relations of the tribe to the rest of the community, and to the State, should remain unchanged. The prejudices of color and caste, and the fears of the burdens it might impose, would much embarrass any attempt, at present, to incorporate them into the general community. The Commissioner was assured by municipal officers of the town of Chilmark, that, if they were made citizens, and the territory should be annexed to that town, the voters would, at once, surrender their town charter.

Believing that no essential change should be made, at present, in the external relations or internal polity of this tribe, and that too much rather than too little legislation on their behalf is to be deprecated, there are, nevertheless, some points on which the interposition of the legislature seems to be required. The Indian traditional law, so far, has worked well, and seems

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adapted to the condition and wants of the tribe, but its success has resulted from a general acquiescence in its administration, there being no legal authority by which its provisions may be enforced, or its results guarantied. The rights, therefore, which have been acquired under it, from generation to generation, are insecure; and, whenever disputes shall arise, which lead to litigation, or whenever disaffected or unprincipled individuals may be disposed to take advantage of this anomalous state of things, for their own benefit, or for the injury of others, much difficulty and embarrassment may ensue, with possibly great wrong to innocent and deserving parties. The sanction of the law ought, therefore, to be, at once, extended to the rights thus obtained in good faith. Another case for legislation, is, the extension of the sanction and authority of law to the school of the plantation. At present, the school committee are without legal authority, with no power to punish or exclude contumacious or rebellious scholars, and thus parents disposed to make difficulty have the opportunity, if they choose to take advantage of it, greatly to mar the usefulness of the school, if not even to break it up. For this evil an adequate remedy should be applied.

Complaint was made to the commissioners, on behalf of the tribe, in 1849, but not in season to be embodied in their main report, of an evil which still exists, and for which they think they are entitled to relief at the hands of the legislature. A young woman of the tribe, for instance, goes to service at New Bedford, or Boston, or some other town, and while there marries an inhabitant of that or another town, of which he is a citizen and voter, having a legal settlement therein. After a lapse of years, the husband dies, and then the widow, with a family of children, returns to Gay Head and claims support for herself and family of foreign children. Such cases, it is alleged, have frequently occurred, imposing an onerous, and, as they think, an unjust burden upon the tribe. They think that they ought to be relieved from the support of those, who voluntarily leave the tribe and acquire homes elsewhere, or, at least, that a time should be fixed, beyond which they cannot return and claim support; and that, where the husband has a settlement abroad the wife should follow that settlement and not be allowed, ever, after marriage, to claim support of the tribe. It may be added,

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that any legislation on the subject, should apply, as well to other cases of voluntary withdrawing from the tribe, as to that of women marrying abroad. Cases have occurred of a young man's leaving and spending his whole remaining life away, and, after death, his children and grandchildren would return to the place for support.

The registration of marriages, births, and deaths, ought to be provided for. Had there been one heretofore kept in the several tribes, such as is now required in the several towns, it would have saved your Commissioner weeks of labor in his investigations and enabled him to ascertain some facts of consequence which he has been unable to determine. In case of the enactment of a law, legalizing the present proprietorship of lands in severalty, and regulating the division and descent, it would add to the necessity of extending the law of registration to this tribe.

The tabular list accompanying this Report, shows the present population of the tribe, as near as it could be ascertained, distinguished and classified as required by the law establishing the commission. It will be seen, that the quantity of land, held in severalty averages but little to a family, and that the number of cattle is also small. Some of the inhabitants hesitated about giving an account of their stock as they owed for much of it, and in some cases it is but nominally theirs, the persons of whom it was obtained holding a lien upon it for its value. Few individuals have personal property beyond the amount of their indebtedness, more than is exempted from attachment to poor debtors, by the laws of the State.

The Commissioner avails himself of this opportunity of acknowledging his obligations to Capt. Flanders, superintendent of the light-house at Gay Head, for his attentions and aid in procuring the statistics of the tribe. And, more particularly, are his acknowledgments due to Hon. Leavitt Thaxter, for the ready, prompt, and cheerful aid, which, from first to last, he has rendered in conducting the investigation—an aid which his long and intimate knowledge o the Indians and their interests peculiarly qualified him to give, and which no other man could have given. To this tribe in particular, and, nearly in the same degree, to all the other Indians of Dukes County, he has been a long and steadfast friend, watching over their interests

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with even paternal solicitude, counselling them in their need, adjusting disputes between them and their white neighbors, and between each other, with many other acts of kindness of various kinds, for all which, he has constantly refused any compensation from them. This unselfish kindness has endeared him to them, and won their entire confidence, so that he has an influence with them that none other can possess, and, when he is gone his memory will be cherished as a benefactor, and none, it is feared, will be left to fill the place vacated by him.

Since my Report was completed, I have ascertained that the annual grant of sixty dollars to the Gay Head school for five years, expired in 1859, and, believing that the reasons which prompted its first appropriation have acquired increased force, and will commend themselves to the legislature, I have reported a resolve for extending the grant for another term of ten years.

MARSHPEE TRIBE.

The District of Marshpee, the residence of the largest distinct body of the descendants of the Indians, now remaining in the State, is situated on Cape Cod, in the westerly part of Barnstable County, and is bounded on the north by Sandwich and Barnstable, on the east by Barnstable, on the west by Falmouth, and on the south by the waters of the Vineyard Sound. The whole number of the tribe, so far as is ascertained, is 403.

Families,	93
Males,	186
Females,	216
Unknown,	1
Natives,	371
Foreigners,	32
Under 5 years of age,	50
From 5 to 10 years of age,	44
" 10 to 21 years of age,	97
" 21 to 50 years of age,	146
" 50 to 70 years of age,	46
Of 70 and over,	20

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Of those who are 70 or over, six are 70 years old, one is 71, one is 74, four are 75, three are 76, two are 77, one is 87, and two are each 93 years of age. The two oldest persons are Lois Pells and Betsy Smith, both widows.

It appears by a statement made before a committee of the legislature in 1834, by Hon. Benj. F. Hallett, counsel for the tribe, that their population in 1767 was two hundred and ninety-two; in 1771, it was three hundred and twenty-seven, of whom fourteen were negroes, married to Indians; in 1832 it was three hundred and fifteen, of whom sixteen were negroes. By the commissioners' report in 1849, it was three hundred and five in 1848, of whom twenty-six were foreigners, all negroes or mulattoes; in 1859, the tribe numbered, as will be seen by this report and the accompanying tabular list, four hundred and three, including thirty-two foreigners, married to natives of the tribe, all negroes or mulattoes, or various mixtures of negro, Indian, or white blood—none of them being pure whites. Sixty-six, out of the whole number of the tribe, at the time of the enumeration, were not residents of the District; but fifty-two of them were considered as retaining their rights in the tribe, and more than half of the sixty-six were understood to be only temporary residents abroad, expecting, at some time, to return to Marshpee, and make it their permanent place of residence. A few others, as a matter of personal convenience, are now residing just over the line, and are so returned, but they consider themselves as identified with the tribe in all respects, and are so considered by the tribe. Fourteen individuals, included in the above sixty-six, whose names are in the "Supplementary List," own no land in the District, but have been gone so long from it, that they are not now recognized by residents as members of the tribe.

In this tribe, as in several of the others, the mortality, within the eleven years preceding, and including the autumn of 1859, was very great. The commissioners' list made in 1848 gives the names of three hundred and five persons, and of these, ninety-two, or 30 per cent. of the whole number were dead in 1859. The number of births during that period, and of deaths of those born within the time, are not known. But there were one hundred children living in 1859, who had been born since the commissioners' report, being an excess over the deaths of only eight. The additional excess in numbers, of the present

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return over that of 1849, consists of persons whose names are not on that return. It is much to be regretted that no provision exists for a registration of the Indian tribes. This is a manifest defect in our law. The value of statistics consists chiefly in their accuracy and completeness, and it seems strange, when so much pains has been taken to perfect our system of registration and to publish the results, that this portion of it should have been overlooked or neglected. It is necessary to the completeness of the system, and if extended to the several tribes, would be valuable, as affording the means of interesting comparisons of the vital statistics of the tribes with those of the other people of the State, and would be an essential aid in any future investigations into their condition, &c. It is therefore earnestly recommended that the registration, in some form, should be extended to all the tribes.*

The whole District of Marshpee has an area of over sixteen thousand acres, comprising

Indian lands held in severalty, acres,		10,231½
" (upland), in common,		2,300½
" Parsonage,		450
" Cedar swamps,		250
" Salt and fresh meadows,		150
Total Indian lands,		13,382
Marshpee and Wakeby Ponds, acres,	850	
John's Pond,	350	
Cotuit, or Santuit Pond,	250	
Ashumete Pond,	200	
Aggregate area of these ponds,	——	1,650
Land held by whites, estimated at		700
Roads, rivers, and small ponds,		400
Whole area, acres,		16,132

A large proportion of the District is light, sandy, and barren, nearly destitute of water, and is of little value except for wood-

* Rightly construed, the Registration Law probably applies as well to Marshpee as to other portions of the State; but it does not appear to be so understood by the officers of the District.

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land; and the growth of wood is comparatively small and stinted. Formerly, most of it was covered with a growth of wood, which, if it had been properly husbanded, would have been an unfailing source of revenue to the tribe, sufficient to place them beyond the reach of want for the support of their poor and all other municipal purposes, and would, beside, have given all the inhabitants an adequate supply of fuel; but, by the Act of March 2, 1842, provision was made for the division and distribution of this domain, so that each legal adult proprietor, male or female, each of the children of such proprietors, and every person of Indian descent, who was born within Marshpee, or within the counties of Barnstable or Plymouth, and who had resided, or whose parents had resided in Marshpee for twenty years or upwards, previous to the Act of 1834, by which the District was constituted, should receive sixty acres of land in severalty, including what each proprietor had previously occupied. The provisions of this Act were substantially carried out in the division which ensued. A large proportion of the land, thus divided, was covered with wood, as already indicated. An idea of its value may be formed, from the fact, that the wood on the parsonage lot, containing only four hundred and fifty acres, was sold in 1845, and the sum of $6,950 was realized from the sale, averaging over fifteen dollars an acre for the whole lot. Almost the whole of the wood that was standing on the land, when it was divided, is gone, and the people have nothing to show for it. The noble patrimony has wasted away, and the whole property of the District, real and personal, would not sell for as much money, now, including buildings and improvements, as the wood on the land was worth when it was divided; and it is doubtful whether a large proportion of the families are as comfortably situated, as well provided for, and in as good a condition to meet their future wants and necessities, as they would have been, had no more been divided to each, than would be sufficient for cultivation and to give them a suitable supply of fuel for their own use. Relying on the sale of their wood, to procure whatever they might want, agriculture was neglected, idle and improvident habits were acquired, and a general unthriftiness ensued, that pervaded the whole District. The marks of this are strikingly apparent at the present day, exceeding any thing of the kind to be found

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on either of the other plantations, with perhaps the single exception of the few families on the Fall River reservation. The new growth of wood, which was coming up on most of the allotments, as well as that on the parsonage lot, which had attained considerable size, has, to a great extent, been destroyed by fires that have, within two or three years, burnt over about five thousand acres of woodland in the District. This calamity falls with peculiar severity on several widows with dependent families, to whom this was almost their only resource. The lesson which the people are now taking is a severe one, but it may be worth its cost, and, if it shall teach them wisdom for the future, they will not have suffered in vain.*

It will have been seen, that sixteen hundred and fifty acres, or more than one-tenth of the whole District, is occupied by ponds of fresh water, without including some of minor size. These afford fine fishing, and are a source of some public

* At the present day, and in the light which subsequent events have thrown on this matter, it is difficult to imagine what influences could have operated on the legislature, to induce it to sanction such an Act, as that which authorized the distribution of the Marshpee lands, or how it could have failed to perceive what consequences must almost inevitably flow from it. Here was a people held in a state of pupilage, under a *quasi* guardianship, forbidden by law to transfer a foot of their land to any but a proprietor of the District, without authority of the legislature—not allowed, even in their collective capacity, by a vote of the whole body, to appropriate a dollar for any public purpose, without the consent of the commissioner—a people, who, by being subjected so long to these restrictions and disabilities, had, to a great degree, lost self-respect and self-reliance, and become, from disuse, unaccustomed to pecuniary responsibility, or the proper management of prudential concerns. Under this law, nearly every married couple among them received one hundred and twenty acres of land, with sixty acres more for each and every child they had; and thus a property was at once placed at their disposal, in the wood growing on the land, of many times the value of the naked land, which the law did not permit them to sell. Without any training to a prudent forecast, having never had the opportunity of acquiring the habit of husbanding their resources; and, accustomed, as they were, to live from hand to mouth, this looked to them like a fund that could never fail, and it is not strange that even the best of them should yield, to some extent, to the temptation to rely on that, rather than their own efforts, for a living, and that the neglect, waste and improvidence ensued, which they have so much reason to deplore. Yet, in truth and justice, we are bound to say, that they, who had the power to prevent it and yet authorized it to be done, are more inexcusable, than are the unfortunate sufferers of the folly.

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revenue. Marshpee and Wakeby Ponds are substantially one, being united by a very broad, deep strait, and present one of the finest sheets of fresh water to be found in the State. Situated in a sandy region, with but little soil or vegetable matter washed into them, to make mud or sediment, much of the shore, for a considerable distance into the water, is nearly a pure white sand and gravel, and the water of such remarkable purity and clearness, as to render every thing distinctly visible at the bottom, almost as much as if there was no water there. Being almost entirely supplied by springs, the water is of a very equable temperature both in summer and winter, and affords a congenial home for large quantities of the finest trout that can any where be found. At the outlet, a stream, sufficiently large to operate a mill, is constantly discharged. This finds its way to the sea, a distance of some eight or ten miles, over a bed of the same kind of sand and gravel as that of which the shores of the ponds are composed. Most of the way, the stream is somewhat rapid, with occasional quiet pools, affording to the trout a desirable and agreeable egress from the ponds to the sea, which is their principal feeding-ground. Here they become very fat, and attain an enormous size, often weighing from three to six pounds, and sometimes reaching eight or ten pounds. No other trout in the market are considered equal to them, or command so high a price. In their passage to and fro, between the ponds, which are their place of residence, and the sea, where they take their meals, the little river is alive with them throughout its whole course, and the sport, thus afforded to the fishermen, is indescribably fine. This fishery is a perquisite of the tribe, and no other person is allowed to fish in the stream without a permit from the proper officer, for which permit a fee of five dollars a day is required for each person. The amount received from the sale of these permits varies from one hundred and fifty to three hundred dollars a year. Between the times of my first and second visit to the District, two young men from a neighboring town obtained permits for two days, during which time they caught over one hundred and seventy pounds of these fine trout, realizing, at a low market value, two or three times the amount paid for their permits. The pickerel fishery, in the ponds, is also very good, and this, too, is a source of some revenue to the tribe. The herring

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fishery, during its season, is usually abundant, the river and ponds being a favorite resort for them, and, though it brings no public revenue, it is a source of some private emolument, and furnishes a liberal supply of a favorite and convenient article of provision, for the use of all the families who choose to avail themselves of it, throughout the year. The season of 1859 was as good as usual, though the run was generally small at other places in that region.

The extensive tracts of woodland, here, reaching into Sandwich and Barnstable, and perhaps into Plymouth, afford a home and shelter to considerable numbers of deer, this being the only place in the State, except perhaps Naushon Island, where they have never been exterminated. The hunting of them has heretofore been a subject of legislative enactment, and, now that the destruction of the wood by fire on so extensive a tract, has circumscribed their range, and, in the same proportion increased the facilities of the huntsman for pursuing them, it is much to be feared, that, without some stringent statutory provision for their protection, they will at no very distant day become extinct in this region.

By the Act of 1834, constituting Marshpee a District, the organization is similar to that of towns, the proprietors electing their clerk, selectmen, (who are also overseers of the poor, surveyors of highways, and school committee,) and one or more constables, and voting the amount necessary for the support of the poor and their medical attendance, the repair of highways, the support of schools, and other necessary District charges. These several officers have duties corresponding to those in towns. In addition to these officers, it provided that there should be a commissioner, appointed by the governor and council, who must be a resident of Barnstable County, in the vicinity of the District, whose duty it was "to exercise a careful supervision over the affairs of said District" and to preside at all meetings of the proprietors, with the powers of moderator. All rules and regulations for the management of the public domain, and all appropriations for any public purpose, must receive his sanction to make them valid. By virtue of his office, he was treasurer of the District, and of the Herring Pond Indians, and, as such, was required to give bonds to the satisfaction of the governor and council for the faithful performance of his trust. He was

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also required to report annually to the governor and council, for final settlement, an account of the receipts and disbursements of the treasury, with his own charge for necessary services, countersigned by the selectmen of the District, with their approval or disapproval of the same. By the Act of 1853, (chap. 186,) the office of Commissioner of Marshpee was abolished, and the office of Treasurer of Marshpee was established, to be also treasurer of the Herring Pond Indians, and he was required annually to report to the governor and council for settlement, an account of all receipts and disbursements, to be countersigned by the selectmen of Marshpee, and some person appointed by the Herring Pond Indians for the purpose, with their approval or disapproval of the same. By the same Act, the District was authorized to choose its own moderator, and to select its own officers, for the performance of all the duties heretofore devolving on the commissioner, so that it now enjoys all the rights of towns, except that of representation and the election of its treasurer.

The Act of 1842 empowers the proprietors to assess taxes for the purposes of the District, but the provision is practically nugatory, for the want of power to enforce their collection. The experiment, when tried, has utterly failed and had to be abandoned. About one-half of the residents paid their taxes, and the remainder refused or neglected to do it, and, as there was no power to levy on the land and sell it for the taxes, there was no remedy. When the public hearing was held at Marshpee, a strong feeling prevailed in favor of a grant of the necessary power for this purpose. But it is not seen how it could be exercised, consistently with the settled policy of the State in reference to the Indians, as, by existing laws, none of the territory can be alienated and pass into the hands of others than proprietors, and there are now, hundreds, if not thousands of acres of land in the District, which could be bought for a price almost nominal, yet find no purchaser, because such proprietors as are able to buy, already hold in severalty more land than they have any occasion for. There would, consequently, be no purchasers. If provision were made that others might become purchasers, it would initiate a vital change in the policy of the State, and lead to a gradual, but certain alienation of a consid-

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erable portion of the lands of the tribe, whose owners would, probably, in that event, be thrown upon the public for support.

The organization of the District has unquestionably been advantageous to the tribe, in preparing them gradually for the change which must eventually come, in their political relations, when they shall be endowed with the rights of citizenship, with the duties, responsibilities, and obligations it imposes. It took away one ground of complaint, by enabling them, substantially, to manage their own affairs. In the same way it encourages their self-respect and adds to their feeling of individual responsibility. Their town meetings are, to them, what such meetings are to our country towns—schools which bring into exercise talents that otherwise might have lain dormant, and aid in better preparing them for other responsible duties. It is said that at some of the town meetings, the discussions are very animated, and are marked by considerable ability. At the public hearing given by the Commissioner at this place, the debates on the subjects introduced were as well conducted as similar debates are in any of our towns, and some of the speakers acquitted themselves very creditably. One of them, in particular, evinced much native humor and a fertility and aptness of illustration rarely equalled, indicating natural talents, that, with the advantages of an education, would have qualified him to shine in any station of life.

The expenditures of the District are, for the support of the poor, of the schools, and the highways, the pay of public officers, the treasurer's salary, and contingent expenses. These amounted, for the year ending September 30, 1859, to $2,398.02, but, in this amount is included between $700 and $800 for making new county roads through the District, the most of which expense was refunded by the State. The number of paupers in the District, dependent for their entire support, is seven, of whom three are State paupers, for whose support the District received in 1859 $189.85. The annual payments by the State, for the support of State paupers, for the last eleven years, have been as follows:—

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1849,	$389 75	1856,	$212 00
1850,	299 45	1857,	117 00
1851,	247 69	1858,	147 18
1852,	436 62	1859,	189 85
1853,	426 52		
1854,	392 00		$3,131 90
1855,	273 84		

The average amount for the eleven years has been $284.72. For the six years preceding 1849, the average payment by the State for the same purpose was $359.24, while, for the six years last past the average has been only $187.97, or but a trifle more than one-half the average of the former period. The annual expense of the paupers of the District including payments for those who receive assistance as well as those requiring entire support, is about $400 per annum.

For the support of the schools of the District, formerly, $100 a year was appropriated from the school fund and $60 a year additional was received, as the interest of $1,000, which was set apart as the District's portion of the surplus revenue, making, in all, $160 a year. But, in 1856, the legislature added $165 a year to the amount, on condition that the District should appropriate $75, and thus make the whole up to $400 a year. This has been done by the District, so that the average annual length of the two schools is about eight months. A marked improvement has resulted from this increased appropriation, in the character of the schools and in the interest manifested in their success; an interest which, if properly sustained, promises most beneficial results in the future. The people are now anxious for increased advantages of this kind, and instructed the undersigned Commissioner, through their committee, to ask, on their behalf, an additional appropriation from the school fund of seventy-five dollars a year, on the condition that they will add twenty-five dollars a year, and thus make up the full sum applicable to the support of their schools, to five hundred dollars a year. This would give them about ten months schooling; and when it is considered that a great portion of the children are obliged to leave the schools as soon as they get to an age which makes their services valuable, in obtaining the means of support for themselves and the families

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to which they belong, it seems very desirable, that, during the short period of their school life, they should have the opportunity of attending school as large a portion of the time, as is consistent with a sound and healthy physical development. The schools are now in good condition, compared with what they were formerly, and the average attendance is about 80 per cent. of the whole number of scholars, which, considering the tender age of many of them, and the great distance that a portion of them have to travel, to reach the school, may be considered very good. The school in the North District, the past year, (1859,) was kept by Miss Ann Fallon, who appears every way competent to the situation, and manifests a laudable interest in the improvement of those under her charge. The visit of your Commissioner to the school was quite satisfactory to him. He did not have the opportunity of visiting the school in the South District, which was taught during the last summer by Miss Nellie C. Davis, but he had a satisfactory report of its condition. The state of advancement of the pupils in these schools, will not, of course, bear comparison with the district schools in our towns. The time has not yet come for that, but, considering the former low state of education in the District, and the disadvantages under which they labor in the want of instruction at home and of association with educated people, with others incident to their peculiar condition, the progress is such as to give cause for hopeful anticipations for the future; and the Commissioner is decidedly of the opinion, that, if the additional amount asked for by the District can be appropriated from the school fund, without essential detriment to other public interests, on the conditions on which it is asked, it will be a good expenditure of the money.

For the support of public worship, no expenditure is required from the funds of the District, except for incidental and contingent expenses, the salary of the missionary laboring among them being paid from the income of the "Williams Fund" for the evangelization of the Indians, in charge of Harvard College. Formerly a minister was settled here, with whom, theologically, the inhabitants did not agree, and this led, gradually, to alienation of feeling, and personal bitterness between them. The consequence was an almost entire abandonment by the people, of attendance on his services, ending, finally, in a lawsuit,

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which was settled by a compromise in 1849, and, since that time, they have enjoyed the privilege of selecting their own spiritual adviser and guide. The Rev. Daniel Hawley is now ministering among them, to apparent satisfaction. He has been with them for one year, and has been re-engaged for the present year.* He manifests a commendable interest in the spiritual and temporal welfare of his charge, but the habit of neglecting or omitting the attendance on religious services, which grew up during the difficulties with a former pastor, had become chronic, and it will probably take some time longer, yet, entirely to overcome it. Yet an increased interest is manifested in religious concerns, and a great improvement, in this respect, is conceded to have taken place within the last fifteen or twenty years, an improvement which may be continued and accelerated by the patient and faithful services of a self-sacrificing pastor. For such a one, this is a promising field of labor, a field where not the Sabbath alone may be profitably employed, but every day of the week, in advice, example, and encouragement, in secular as well as religious affairs. Ignorance, poverty, and want, are favorable neither to morality nor religion, and, with such a people as this, every improvement in their social condition, and every advance in knowledge, whether in literature, science, art, or domestic economy, prepares them for the more ready reception of the vital truths of religion, and qualifies them the better for the discharge of the duties devolving on them, as moral and accountable beings. Especially is the inculcation of industrious habits important, and he who will manage to interest them more in the pursuit of their avocations, who will teach them so to diversify their pursuits as to make them productive, and thus render them agreeable and attractive, will confer a favor on them, the extent and value of which can hardly be appreciated. There is nothing which strikes a stranger, visiting the District, with more force, than the want, among many of the people, of habits of patient, persevering, well-directed industry, and he who should effect a change in this respect, would be a public benefactor.

It should have been stated that the family of the missionary occupy the parsonage belonging to the District, connected with which, is about three acres of pretty good land under cultiva-

* 1859. He continued with them through the year 1860.

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tion. The meeting-house of the District is a neat building, sufficiently capacious for the accommodation of the people, and, by the bounty of the State was put in good repair in 1855. It is beautifully situated in a fine grove, where the land slopes gently to the south and west, on one of the most prominent elevations in the District, commanding a good view of the adjacent country. The secluded situation, at some distance from any human dwelling, with no external sound but the rustling of the foliage in the breeze, the choral song of the feathered songsters, and, perhaps the distant roar of the ocean, is well calculated to inspire a religious and devotional feeling.*

The resources of the District from which to meet their expenditures, are, $325 from school fund and surplus revenue, toward the support of the schools; interest on the fund created by the sale of the wood on the parsonage lot, so called, which now amounts to about $120; fisheries, about $200, and rent of meadows, about $100. Aside from some other trifling occasional receipts, this is all the regular income that can be relied on, and whatever this falls short of meeting the expenditures, has to be taken from the principal of the fund. The amount of the expenditures for the year ending the 30th of September last, has already been stated at $2,398.02, including the amount paid for new roads. After deducting the amount received for school money, and $715, received of the State, on account of the new roads, the whole revenue of the District was insufficient by the sum of $677.04 to meet the expenditure, and that amount had to be taken from the principal of the fund and diminished it to that extent. At this rate, in less than four years more, the fund will be exhausted. When that is gone, there was formerly a prospect that its place might be supplied, to a considerable extent, at least, from the wood growing upon the common lands. There was a good growth again coming on, upon the parsonage lot, besides what stood upon the other common lands, but the great fires of the last season have nearly destroyed it all.

* Since this was written, during the year 1860, the Sabbath School Library of the District has been largely increased by donations from the Baptist friends of this people, in Boston, through the influence of a Boston lady who visited them, and interested herself in their Sabbath schools.

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The tabular list, herewith presented (see Appendix, A) gives, in addition to the quantity of land held by the respective proprietors in severalty, a valuation thereof, with the improvements, and a valuation, also, of such personal property as is held by them, respectively, beyond what is exempted by law from attachment. This valuation was very carefully made, and, it is believed, presents a fair estimate of the value of property held by individuals in the District, to which, if the public property be added, will present the following aggregate of the value of all the property of the District:—

Value of 10,171 acres of land held in severalty, with the improvements thereon, ...	$67,055 00
Value of personal property	3,598 00
" of 2,300½ acres held in common, . . .	9,202 00
" " 450 " " " (parsonage) .	2,250 00
" " 250 " " " (cedar swamp)	1,000 00
" " 150 " salt and fresh meadows, .	2,250 00
	$85,355 00

Public property, $14,702; private property, $70,653.

This valuation would have been considered a low one, two or three years since, before the devastating fires had swept over the District; but it is higher than the property would probably sell for, now, if put into the market.* This value, then, must be considered prospective rather than actual, to be enhanced as the wood again grows up. The amount of land held in severalty, gives an average of nearly one hundred and ten acres to each of the ninety-three families of the District, which, to those residing in sections of the State, where the soil is fertile, and valuable for cultivation, would seem to place them in very comfortable circumstances. But it must be remembered that most of this land is of no value, except for the wood it produces; that the wood is of very slow growth, and that nearly all of it has just been burnt off, so that a long time must elapse before it

* By this, is meant, if put into the market, with competition open to everybody. If put up at auction with the existing restriction, that none but proprietors of the District could be purchasers, much of this land would hardly bring enough to pay the auctioneer's fee.

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will again yield any income. A better estimate of their condition may be made, by considering that the whole value of the real estate held by individuals in the District, averages only the nominal sum of seven hundred and seventy dollars to a family, including buildings and all improvements, and that a considerable portion, even, of this amount, is in land that will yield no income whatever, for nearly, or quite twenty years. But, the real poverty of the people is more strikingly evinced, by the fact, that the whole personal property of the District, saving such necessary articles as the law exempts from attachment, throughout the State, averages only about forty dollars to each family. In this almost entire absence of material prosperity, we cannot reasonably look for much social advancement. And, it is an undoubted fact, that there has been very little improvement, either socially or morally, in the District, within the last ten years. In the northern part, there has been some progress in these respects, while the central and southern portions have remained nearly or quite stationary, except in one or two instances.

The stock kept in the District, the value of which is included in the estimate of the value of the personal property, consists of eight horses, twenty-four oxen, twenty cows, thirty-four young cattle, fifty-five swine, and six sheep, being an increase, in the last eleven years, of two-horned cattle and twelve swine, and a diminution of eight horses, and thirteen sheep. The diminution of the horses has probably been in consequence of the destruction of their wood, being no longer required to carry it to market.

The amount paid from the State treasury for the last eleven years for the support of paupers, has already been stated. As the District supports its own paupers, and, as this money was paid for the support of State paupers, who happened to be residing there, it is not properly chargeable to the District. The amount drawn from the school fund, for the use of schools in the District, has also been stated. The payments by the State for other purposes in the District, during the same time, are as follows:—

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1852, for parsonage house,	$600 00
1855, for repair of meeting-house,	500 00
1856, further sum for the same,	350 00
1855–6, for repairing school-houses,	525 00
1859, for new roads and bridge,	715 00
	$2,690 00

One of the county commissioners for the county of Barnstable has called the attention of the Commissioner to the subject of the expenditures of the county, incurred for the making of roads in Marshpee, and for the expenses of criminals belonging to that District.* The copious extract from his letter, contained in the annexed note, fully explains the ground of complaint,

* A letter from Edward W. Ewer, Esq., the county commissioner referred to, says: "Since I saw you I have been constantly engaged, so that I present you with general, only, rather than specific results in our accounts with the District of Marshpee. First, the road commencing near Solomon Attaquin's and running past the school-house in the North District, and which is purely local in its advantages, cost the county (land damages and fencing) $274.2. Second, the road passing near the meeting-house and extending to Waquoit Mills is of more general utility, and cost the county for construction $610. There was no land damage or fence to pay for on this road. Total for roads during the last year, exclusive of commissioners' bills, sheriffs' services, clerk's fees, advertising, &c., $884.23, which the State has been petitioned to refund to the county.

"The expenses at the jail for board of prisoners during the year 1857 were $1,062, of which $82 was for natives and residents of Marshpee, and about as much more on account of prisoners, whose crimes, but for their contact with this, unfortunately, weaker race, had never been committed. In 1858 the whole expense at the jail at Barnstable was $1,226, of which $95.06 was for Marshpeeans, with the same allowance as above to Marshpee, as the procuring cause. Thus, about 8 per cent. of the cost of boarding prisoners at bar is directly referable, and twice that number indirectly, to our contiguity to the District. This does not look so large as it would when we consider that, probably, about the same proportion of our criminal costs, so far as they are paid by the county, of the expense of constructing and maintaining county buildings &c., is chargeable to the same source, and this, too, when the State has assumed the guardianship and support of this race.

"We have a jail in Provincetown for that and the adjoining town of Truro, the expense of which, I think, is less than for the District of Marshpee alone. We consider our case anomalous. We do not object to bearing our full proportion of public burdens. Do we not, in your opinion, have to bear more? We think we do."

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and, as the subject has been brought by the county before the legislature, the Commissioner has not felt bound to make any investigation of the matter; but he feels at liberty to say, that the question is one, which appears to have another side to it, and that he does not consider it quite clear that the county is entitled to remuneration from the State, for *all* the expense it may be subjected to, by the incident of having this tribe within its limits. That incident is one for which the State is not responsible. The Indians are in their own home, their own, by the strongest and most sacred of rights, original and uninterrupted possession, and the guaranty of the State added thereto. The adjacent and surrounding country was settled by the whites with a full knowledge of the existence of this incident, and of the liabilities to which they would be subjected by its existence. The interference of the State has been purely of a beneficent character, advantageous both to the Indians and the surrounding population, and therefore imposing no new obligations on itself, to protect the latter from any of the inconveniences incident to their proximity to the former. Had the State omitted its guardianship of the Indians, their property would have been squandered, they would have commingled with the other population of the county, pauperism among them would have greatly increased, and the concomitant evils, from which the people of the county are now exempt, would then have fallen upon them, without any shadow of a claim on the State for relief. The amount of crime, in that contingency, and the consequent expenses of its suppression and punishment, would, in all probability, have been at least as great as they are now, yet no one would think the county entitled to relief from the State. The presence of the Indians in the county may be a disadvantage to the other inhabitants; but all localities have their peculiar accompanying advantages and disadvantages, and when the government of the State undertakes to equalize these, it departs from the legitimate purposes of its institution.

In drawing toward a conclusion, we have to lament that a more favorable account could not be given of this, the largest community of the descendants of our aborigines in the State. Here, wider extremes are found than in almost any of the other tribes in the State. A portion of the population are industrious,

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frugal, and moral, with some among them who are earnest in their aspirations and endeavors for a higher and better state of things in their tribe. Others are idle, improvident, and, to a greater or less extent, immoral, and some among them are living in a state of more wretched poverty and degradation than are to be found in any other tribe, with a very few exceptions. The circumstances of the southern portions of the District are peculiarly unfavorable for progress. It lies between two bays, which project inward, and cut them off from communication with others, on either side. The natural poverty of the soil, and this comparative isolation precludes them from obtaining profitable employment at home, and almost inevitably drives the men to a seafaring life, as a means of subsistence. In that life, habits, uncongenial to steady application and industry in other pursuits, and to thrift in any avocation, are acquired, while their families are left at home, too often neglected and uncared for, to get along as best they may. Here, away from the avenues of public travel and intercourse, aside from the excitements of business or pleasure, without the incitements to effort, which are induced by the contact of refined and polished society, it is very natural for them to subside into a listless and apathetic state, careless for almost any thing beyond the supply of absolute physical wants, for the time being. Such, substantially, has been the effect of the combination of circumstances in which they are involved. But there is still hope for the future. The steady, though somewhat slow progress of temperance principles and practice, the consequent improvement, in some instances, in their economical and social condition, and especially the increased interest manifested in the proper education of their children, all afford ground for encouragement.

In the existing state of things, in the District, it must be obvious that this tribe is not prepared to assume the responsibilities of citizenship. To force this condition upon them, with the consequent withdrawal of the guardianship of the State, would inflict a wrong, and would be a violation of the implied faith of the State—implied by its former action, which is equivalent to a pledge, that, so long as they desire the special protection of the State, and it shall be necessary to prepare them for the struggle of life in open and free competition with others, it shall not be withheld from them. Nothing but the demand of citizen-

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ship, with its privileges and responsibilities, by the Indians themselves, as a right they are desirous of possessing, would justify the extending of it to them. And it is satisfactory to know, that the Indians take a correct view of the matter. At the public hearing, given at Marshpee, the question was brought up for consideration. One of the first speakers, a foreigner,* who married a woman of the tribe, and who has resided but a short time in the District, near the border, among the better conditioned and more intelligent portion of the inhabitants, advocated the application to the legislature for the extension of the right to them, but after a full and free discussion, the vote was unanimous in favor of remaining as they are, the individual who had spoken on the other side voting with the rest.

A committee was appointed at the public hearing, to consider the wants of the District, and to report thereon to me. In their report, they request me to ask three things of the legislature, on their behalf,† viz.:

1. That authority be given, by law, to the District to nominate their own treasurer, subject, of course, to the confirmation of the governor and council.

2. That an addition of seventy-five dollars be made to the annual appropriation from the school fund, for the benefit of their schools, on condition that they add twenty-five dollars additional to it, so as to raise the amount annually expended for their schools from four hundred to five hundred dollars.

3. That they be empowered to elect a delegate to represent them in the legislature.

Superficially examined, there is much plausibility in the first of these requests. The youth of fourteen, who is left without a parent, is permitted to choose his own guardian, subject to the approval of the judge of probate; and why should not this community be allowed the same privilege, in relation to their treasurer, who, so far as the keeping of their funds is concerned, it is held, is a *quasi* guardian, under another name. If the same principles were involved in both cases, there would seem to be no good reason why the tribe should not have the privi-

* This word is used in the Indian sense, to imply any one not a native of the plantation, or of one of the kindred tribes.

† See Appendix, B.

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lege they ask. But they are not. In the case of the ward, who chooses his own guardian, the State has no interest other than that it has in the welfare of every other citizen of the State. The only duty that the guardian, as such, owes to the State is to protect the rights and guard the interests of his ward. But, in this case, the Marshpee District has not the means of providing, to the full extent, for its public charges, such as maintaining its poor, building and repairing its highways, supporting its schools, &c., and whatever deficiency there may be, in meeting these exigencies, the State provides for. It has, therefore, a direct interest in the safety of the funds of the District, and has virtually taken them into its own keeping, and thus become responsible for them. While, in a spirit of just liberality, it has relieved the District of the restraints formerly imposed on it, and conceded to it the right to elect its own officers, to manage its own public affairs, and to have control of all expenditures of money for such purposes, it has interposed its own authority only for the security of their funds from the danger of loss, to which all public moneys are so peculiarly exposed, and to which, from the circumstances of the case, those of the District would be more liable than most others. Having assumed this responsibility for the safe keeping of the funds, it is most obviously proper, that it should be unrestrained in the selection of the treasurer by whom that duty is to be performed. He is the officer of the State, and not of the tribe, and, if the view here taken is correct, it is the State and not the tribe that is to be affected, favorably or unfavorably, as this officer shall perform his duties with fidelity or otherwise. This being so, the appointment should obviously proceed from the party whose interest he represents. He should feel that he is the officer of the State, and not dependent on the proprietors of the District for the place he holds.

With this view of the question, I cannot recommend the change that is asked for. In the exercise of the duty which devolves on the governor, in making the appointment, there is no reason to fear that he will ever needlessly wound the sensibilities of the proprietors, or that he will not lend a patient ear to any representations they may make on the subject, and give them a candid consideration.

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The request for an addition to the school money of the District has already been favorably noticed, but I cannot let the opportunity pass, without again urging its favorable consideration on the legislature. The establishment of permanent schools in both sections of the District, with only the necessary vacations, usual in such schools, under the charge of suitable teachers, would be a great blessing to the tribe; and I look upon it as one of the most effective agencies at our command, for its regeneration.*

The third request involves considerations less vital than the second, and it is, therefore, much less important how it may be determined. Some advantages would undoubtedly be secured by granting it. It would give to the members of the tribe a more general interest in the affairs of the State, and conduce to their political education, preparatory to the time when they may be required to assume the duties of citizenship. It would afford a healthy stimulus to the people, to qualify themselves, by intelligence and moral worth, for the office of delegate. The delegate would carry back from the legislature an amount of information and a general influence, that would not fail of being useful to the tribe, and the legislature itself would secure a source of information on matters pertaining to the Indians, in such a delegate, not readily accessible in any other mode. I would therefore commend the request to the candid consideration and sound judgment of the legislature. It is understood that the applicants would be satisfied with a biennial or even a triennial representation, and it will be understood of course, that, if allowed a delegate, he could have no right to vote.

I would here acknowledge the obligations I am under to Hon. Charles Marston, Treasurer of Marshpee, for the patience with which he has submitted to the protracted interrogating, to which I have had occasion to subject him, relative to the inhabitants and affairs of the District, and for the promptness and uniform courtesy with which he has responded to my inquiries, and which have marked his whole intercourse with me, the more

* It may not be inappropriate to say that my views, as here expressed, in favor of the proposed appropriation, and in relation to the importance of increased facilities for the education of the children of the tribe, have received the full concurrence of the treasurer of the District, to whom they have been submitted.

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grateful, because it contrasts favorably with my experience in some other quarters. To Solomon Attaquin, one of the selectmen of Marshpee, for 1859, I am also under particular obligations, for the cheerful and ready aid he has afforded, and for the large amount of desirable information he has communicated. If the District had a few more men, combining in each, his intelligence, probity, and general character, we might look hopefully for its future progress in the right direction.

HERRING POND INDIANS.

This tribe is located on the east side of Herring Pond, on a neck of land lying between that pond and Cape Cod Bay, the territory being chiefly in the south-easterly part of Plymouth, but a small portion of it is in the northerly part of Sandwich; the nearest convenient point of access to it being from the rail-road station at North Sandwich. The whole number of the tribe, excluding women who have married and live with their husbands in other tribes, is sixty-seven.*

Number of families,		19
Males,	31	
Females,	36	
	—	67
Natives, including those who were born in other tribes but married and live on the plantation,		62
Foreigners,		5
Under 5 years of age,	9	
From 5 to 10 years of age,	5	
10 to 21 years of age,	12	
21 to 50 years of age,	32	
50 to 70 years of age,	8	
Of 70 and over,	1	
	—	67

The mortality in this tribe, within a few years past, has been remarkably great, exceeding, even that at Christiantown and Chappequiddick, already referred to. Of fifty-five persons returned by the commissioners as belonging to the tribe in

* Having homes on the plantation, forty-five, residents elsewhere, twenty-two.

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1849, twenty* are now dead, making a mortality of more than one-third, in the short space of eleven years—a rate, which, if continued would soon make the tribe extinct. This does not, of course include the deaths that have occurred among those who have been born within that period. During that time, there have been only ten births of children who are now living, so that there has been a reduction of ten in the number of residents, and but for the additions which have been made to the present return, including three families which do not reside on the plantation, and a few that were accidentally omitted in the former return, it would show an actual reduction in the number of the tribe, to that extent. Only four of the deaths were of persons who were of 50 years of age and over, in 1849, and one only under 10 years of age—two periods of life that usually show the greatest number of deaths.† Whatever the causes of such great mortality may have been, it is hoped they are not such as are permanent in their character.

The territory of this tribe is mostly light and sandy, and of little value for cultivation. In 1850, by virtue of a Resolve of the legislature, about 1,800 acres of it was divided among the inhabitants, by whom it is now held in severalty, as will be

* The whole mortality of residents of the District, including children, during the eleven years, was twenty-five from the following causes, viz.:—

Consumption,	14
Old age,	2
Drowned,	2
Infantile,	4
Smallpox,	1
Unknown,	2
	—25

being equal to one-half of the average population of the plantation during that time, the whole number in 1849 being fifty-five, and at the present time forty-five, averaging just fifty. The number of deaths of members of the tribe not residing on the plantation is not known. The mortality by consumption is most extraordinary, amounting, as will be seen, to more than one-fourth of the whole population, in the short period of eleven years.

† The report of the commissioners, made in 1849, says: "The Mrs. Fletcher, Blackwell, Gardner, and Bartlett, [they might have added, Conet, also,] are sisters from Yarmouth, of the maiden name of Lindsey. The families, in which they are wives and mothers, comprise twenty-four individuals, nearly half the tribe; and their condition elevates, very much, the average of the intelligence of the tribe." It is a melancholy fact to record, that these women, thus justly eulogized, have all gone, to swell the numbers of those, whose deaths have made such fearful inroads in the ranks of this little community.

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seen by the accompanying return. The remainder—about 1,200 acres—remains in common and is at present unproductive of income. It was formerly covered with wood, which has all been cut off, and, being pitch pine land, none of the new growth has attained sufficient size for cutting, nor will it for some time to come, as a fire ran over the portion of it on which was the largest growth, a few years since, and destroyed the wood which was nearly large enough to cut.

The people at Herring Pond have no municipal organization. They are in the practice, however, of meeting together and consulting in relation to their affairs, much the same as if they were regularly organized. They make their wishes known to their treasurer, with whom they appear to have a good understanding, and between him and them, the confidence and satisfaction appear to be mutual. The resources of the tribe, aside from the common land, not now productive, consist in a fund created by the sale of the wood on their land, which amounted, according to the recent report of the treasurer, to $8,179.46, on the 30th of September, 1858, and to $7,604.63 on the 30th of September, 1859, last past, showing an excess of expenditure over the income of the fund, in one year, of $574.83.* Such an excess, if continued, will, in a few years, absorb the whole fund, and leave the tribe without resources for public purposes, other than is derived from the growth of wood on the common land, which, there is no reason to believe, will make good the deficiency, or afford an adequate revenue for the future, unless the present rate of expenditure is quickly and largely reduced. Whether such reduction, so greatly to be desired, can be effected to an extent that will give satisfactory assurance of sufficient provision for the future, must be left to the wisdom, firmness, and concerted action of the treasurer and people. And the suggestion is worthy of consideration, that it is a dictate of a no more than reasonable prudence, for them to husband their resources against the occurrence of that more than possible contingency, when the State may think it best to withhold from

* By the treasurer's report of Sept. 30, 1860, it appears that the State paid during the last year $300 towards the repairs on the missionary house, and that the balance of the fund on hand, at the date of the report, was $7,705.43, and that the actual expenditure for the year preceding that date, was $180.20 more than the income of the fund.

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them any aid, other than such as is afforded to all the indigent inhabitants of the Commonwealth.

The expenditures of the tribe are, for the support of the poor, in sickness and in health; for the salary of their physician, who receives a fixed annual stipend of $40 for his services; for repairs, &c., on meeting-house and mission-house; for funeral expenses; for tuition of children in the public schools; for a portion of the missionary's salary; and $80 a year for the services of the treasurer; beside some other contingent expenses; a full account of all which will be found in the annual reports of the treasurer.

The moral and social condition of this tribe is at least as good as that of any other in the State. The people are generally temperate and industrious. Formerly, one of them was intemperate and some others were addicted more or less to drinking habits, but they all appear to have reformed in that respect. Though not possessed of much property individually, they are mostly above the condition of suffering and want, and what poor they have are comfortably provided for. Socially, there has been a great improvement within the last twenty years, and the improvement still continues. Their dwellings are comfortable and decent, and generally have an appearance of neatness and order.

Their educational privileges are the same as those of the other children in the vicinity, with whom they attend the public schools, in the towns in which they reside. The average attendance of the children is about 80 per cent. of the whole number. They receive an annual allowance from the school fund of the State, and any deficiency, to meet the expense of schooling, is taken from the fund of the tribe. They are provided with a good meeting-house, and have the regular services of a missionary, employed by the year, at a salary of $300, of which $200 is contributed from the income of the Williams fund in Harvard College, and the other $100 is paid from the fund of the tribe.

Of those whose homes are on the plantation, eight are seamen, one is a carpenter, one a barber, and the rest of the males are farmers and laborers. Of those who reside elsewhere, two are barbers, one a shoemaker, one a seaman, and the occupations of the others are unknown. Most of those residing away, will probably never return to the plantation. Two families of these are in California, another has been in Nantucket more than

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forty years, and another is settled in mechanical business in New Bedford.

In concluding this brief review of the condition of the Herring Pond tribe, the Commissioner can see no good reason for changing its relations to the State. Its relative condition, as compared with former years, though not all that could be desired, is satisfactory, as showing a steady progress in the march of improvement, with a reasonable assurance of its continuance. With the faithful services of a competent and conscientious missionary, the careful supervision of the Commissioner, the continued encouragement of education by annual appropriations from the school fund, and the other moral and social influences which may be brought to bear upon them, we may hope, that, at no very distant day, they may be in a condition safely to be intrusted with the entire management of their own affairs, and to be placed on the same footing as all other citizens of the Commonwealth, entitled to share their rights and privileges, and charged with their responsibilities and duties. But, at the present time, such an experiment, it is believed, would prove a disastrous failure, sacrificing the best interests of the tribe, and imposing new burdens on the State or portions thereof. The provision, recommended to be made in the general Report, by which individuals who choose, may come into possession of the rights of citizenship, is all, it is believed, that good policy or justice require to be done for the present.

NATICK INDIANS.

Of all the tribes which held reservations, and were placed under guardianship by the State, the Natick Tribe is nearest extinct. There are, scattering about the State, and commingled with other tribes, particularly the Hassanamiscoes, those who can trace descent back to the Naticks, but of those who claim, now, to belong to the tribe, only two families remain, and one of these is descended equally from the Naticks and the Hassanamiscoes. Their whole number is twelve, viz.:

Families,		2
Males,	7	
Females,	5	
	—	12

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Under 5 years of age,	. . . .	1
From 5 to 10 years of age,	. . .	1
10 to 21 years of age,	. . .	5
21 to 50 years of age,	. . .	4
Over 50 years of age,	. . . .	1
		— 12

This tribe has no common lands. The last of their reservation was sold under a Resolve of the legislature, of the 4th of March, 1828, and the amount arising from the sale was received by the guardian, and constitutes a fund, from which payments have been made, as were needed, for relieving the wants of members of the tribe. The fund amounted in 1838 to $1,226.86, in 1849 to $1,291.13, and, in 1859, to $1,122.11, as appears by the guardian's report of this year. The guardian allows six per cent. interest on the fund, and charges a commission of two per cent. for having the charge of it.

The original Resolve, authorizing the appointment of a guardian, was passed February 27, 1810. This authority was renewed by the Resolve of June 11, 1814, which Resolve also required that " the guardian, thus appointed, shall be held to render an account, annually, to the governor and council." Another Resolve of February 13, 1819, authorizes the guardians " to expend and appropriate, *under the direction of the overseers of the poor of said town*, all, or any part of the funds in their hands, belonging to said tribe; and a certificate, under the hands of said overseers, of the expenditure and appropriation of said funds, shall be a sufficient voucher in the hands of said guardians, in the settlement of their accounts, as such." From a misapprehension of his duties, a former guardian omitted to render the required annual account to the governor and council, but the present guardian, Hon. John W. Bacon, has conformed to the legal requisition in this respect. Whether he has also conformed to the requisition to make his expenditures under the direction of the overseers of the poor of the town, and obtained their certificates, as vouchers of his accounts, does not appear from the report. There is no reason, however, so far as appears, to suppose that the fund has not been judiciously managed, and the subject would not have been alluded to, but for the irregularities which have prevailed in the man-

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agement of Indian affairs elsewhere, through which, the funds have been wasted and lost.

With the diminished numbers claiming to belong to this tribe, no sufficient reason can be perceived for continuing the guardianship. As there are but two families, it would seem just that the remaining fund should be equally divided and so invested as to give the benefit of a moiety thereof to each family. The overseers of the poor in the towns where they reside, would unquestionably be willing to take charge of the fund, in their official capacity, and thus save the expense of the guardianship—a sum, which, though small in itself, is yet, an object of some importance to the poor and needy. If the fund could be so applied, as to secure to each of the families a permanent home, to be held in trust for their benefit, it would confer a blessing on them, and be likely to stimulate them to renewed efforts to obtain a comfortable and respectable livelihood. Should it be placed in the hands of the overseers of the poor of the towns, they would be able to judge whether such investment would not be the best that could be made of it. The fund thus disposed of, there would be nothing in the way of placing this remnant of a tribe on the same legal footing with all other citizens of the State.

There are a few other individuals, descended from this tribe, but who consider themselves as belonging to another tribe, into which, the ancestor belonging to Natick intermarried. There are some others, who claim to be of the Natick Tribe, but the claim appears to have no foundation other than that one of their ancestors formerly resided in Natick, but it is believed that he never was supposed to belong to the tribe.

PUNKAPOG INDIANS.

The Punkapog Tribe of Indians were formerly proprietors of a tract of land in Canton, Norfolk County, containing five thousand acres, which was granted them by the general court. None of this property now remains in their possession. The last of it was sold by the guardian, about twenty years since, in pursuance of a Resolve of the legislature. The full-blood Indians of the tribe are all extinct. Their descendants, who,

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like those of all the other tribes in the State, are of various grades of mixture, of Indian, white, and negro blood, number, so far as is ascertained, one hundred and seventeen persons, as follows:—

Families,		31
Males,	53	
Females,	64	
	—	117

Natives,		103
Foreigners,		14
Under 5 years of age,	16	
Of 5 to 10 years of age,	11	
10 to 21 years of age,	23	
21 to 50 years of age,	52	
50 to 70 years of age,	13	
70, and over,	2	
	—	117

The two who are over 70 years of age are Rebeckah Davis, aged 71, and Mary Roby, aged 85. Included in the above one hundred and seventeen, are about fourteen persons of other races, who have intermarried with members of the tribe. The greater facilities for procuring employment and obtaining a living in and about Boston, and at other places, had gradually drawn away a considerable portion of the tribe, and there being no registration of it, an impression had become prevalent, that the tribe was nearly extinct. Only thirty-one of its members now reside in Canton, and of these some five or six are of other races. The commissioners' report, in 1849, put the whole number of the tribe at ten—four males and six females; and the guardian's report, in 1857, says: "The Punkapog Tribe of Indians is nearly extinct; only some fifteen or twenty, and those mostly of mixed blood, remain." It now appears that there are over one hundred, without including those of other races, intermarried with the tribe, and it is probable that there are others not yet ascertained. This lack of reliable statistics prevents the making of any comparison of the present number with what it has been at former periods, so as to show whether the tribe is

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increasing or diminishing. There are instances, however, of great mortality, similar to those which have prevailed in some of the other tribes. One of these occurred in the family of a venerable woman, a widow, now 71 years of age, a communicant of the Baptist church, and a State beneficiary, who resides near the State House in Boston. She has been the mother of sixteen children, all of whom she reared to adult age. She also brought up, in like manner, eight of her grandchildren, whose parents died in their infancy, or childhood, making, in all, twenty-four children brought up by this "mother in Israel." Yet, while herself enjoying a green old age, not one of her sixteen children is living, and the whole of her posterity, now alive, is not half so many as the original number of her own children. Speaking of her success in bringing up so many children, she said: "I have been a very smart woman in my day. My mother brought up seventeen children; and I always told the family that I intended to do as well as she; and," she added, energetically, "I should, and more, too, but that *I lived five years* a widow." Old as she is, and so lame that she can get about but little in the winter, she has managed to get a comfortable living, with the aid from the State, of a sum sufficient to pay her rent. Notwithstanding her straightened circumstances, every thing about her house exhibits the neatness and order that characterize the good housekeeper.

The Punkapogs have no organization. Those who reside in Canton are not taxed, and do not exercise the right of suffrage. Those residing in other towns, so far as is known, stand on the same footing as other people, no reference being had to their being of Indian descent. Both in Canton and elsewhere, they enjoy educational and religious privileges in common with others, and avail themselves thereof to the extent that is usual with those in their condition of life. The children attend the public schools, and some members of the tribe are connected with the churches where they reside. No case is known of any pauper in the tribe dependent on the public for his entire support. Five persons have received aid from the State. The amount paid for each, during the last seven years, ending on the 1st of April each year, has been as follows:—

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	1853.	1854.	1855.	1856.	1857.	1858.	1859.
Isaac Williams, .	$50 00	$50 00	$50 00	$50 00	$50 00	$50 00	$82 71
Rebeckah Davis, .	50 00	51 00	50 00	50 00	50 00	50 00	50 00
Polly Croud, .	50 00	50 00	50 00	50 00	50 00	50 00	50 00
Elizabeth Bancroft,	48 90	51 10	50 00	52 00	52 00	52 00	82 00
Sally Burr, . .	–	–	–	–	–	–	45 00
	$198 90	$202 10	$200 00	$202 00	$202 00	$202 00	$309 71

The annuities paid to the above are permanent annual payments, except that to Sally Burr, to whom a grant was made in 1859 for one year only. Her necessities require its continuance, and the age and increased infirmaties of Mrs. Davis will probably require additional aid hereafter. There are one or two other cases that, it is feared, may before long require aid from the State.

The Punkapogs are a quiet and peaceable race, and are believed to be as moral as those of the same condition in life, in the general community with which they are commingled. Few of them are possessed of property, and only three of them are known to hold real estate, the names of whom will be found in the tabular list. It is claimed, by some members of the tribe, that there is a tract of land, including a valuable cranberry meadow, which was a part of the original reservation, that has never been legally alienated, but is wrongfully held by others in derogation of the Indian rights. Complaint thereupon was verbally made to the Commissioner, but, at so late a period as to preclude a public hearing of the case. The Commissioner is informed that the subject has been before a former legislature, and was referred to a special committee, who, after such investigation as they were able to make, reported "leave to withdraw," to the petitioners. The occupants claim that they have had possession of the premises something like a hundred years, during the whole of which period, the Indians have had a guardian, whose duty it was to guard and protect their interests, and who, had their claim been a good one, would have enforced it. The Indians reply to this, in part, that, in relation to a portion of the lands in question, they were held by the occupants under an ancient lease, so that the guardian could not legally interfere; but, that this lease has expired, or is about to expire, by

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its own limitation, when their claim to the land will be perfect. Such is the case, as represented to the Commissioner; but of the facts he does not, of course, pretend to speak, having made no investigation; but, as the case was brought before him, he felt it his duty to take this notice of it in his report, and leave it for the Indians to take such action thereupon, hereafter, as they may deem best.

Scattered, as the Punkapogs are, in the general community, of which a large portion of them now practically form an integral portion, having no distinct organization, and no reservation, to give them a distinct interest, or to form a common bond of union among themselves; sustaining, moreover, as most of them do, the moral character and social relations to fit them for good citizens; the Commissioner can see no good reason why the rights and privileges of citizenship, which have so generally been conceded to them in the places where they reside, should not receive a legal recognition, reserving to all adults of the tribe the right, if they choose, to retain their present legal relations to the State. Their case is widely different from that of those who are congregated together on reservations, and the sooner every mark of distinction between them and the rest of the community is effaced, consistently with existing rights, the better it will be for them and for the people among whom they dwell.

FALL RIVER TRIBE.

The reservation of the Fall River, or Troy Tribe, is situated on the east shore of the North Watuppa Pond, in the easterly part of Fall River, about five miles from the business portion of the city. The whole number of the tribe, so far as is ascertained, is seventy-eight, viz.:—

Families, ...		16
Males, ...	41	
Females, ...	37	
	—	78
Natives, ...		72
Foreigners, ...		6

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Under 5 years of age,	. . . 8	
From 5 to 10 years of age,	. . 5	
10 to 21 years of age,	. . 21	
21 to 50 years of age,	. . 32	
50 to 70 years of age,	. . 8	
Of 70 and over,	 3	
Unknown,	 1	
		— 78

Those over 70 are of the ages, respectively, of 71, 71, and 76 years.

When the notices of the great mortality in four of the other tribes were written, the facts in relation to the same thing in this tribe had not been ascertained. From an examination of the statistics, it appears that death has been no less busy in this tribe than in the others, in proportion to its numbers. The whole number of persons, returned by the commissioners in 1849, as belonging to the tribe, was thirty-seven, the names of whom were given, as was the case in reference to the other tribes. Of these thirty-seven, it is known that twelve are dead, four others are supposed to be, and the residence of two others, whose ages, if living, are now (December, 1859,) 71 and 76, respectively, are not known, and they may, or may not, be living, so that the actual mortality is somewhere between 32 and 50 per cent. of those who were living in 1848.

The original Indian reservation at Fall River formerly belonged to a person who was convicted, in 1693, of "high misdemeanors." He was sentenced to pay a fine of £150, but managed to escape from the officer having him in charge, and fled to Rhode Island. After a few years, being desirous of returning to the State, Major Benjamin Church presented a petition on his behalf to the general court, proposing that, for the satisfaction of said fine of £150, which was imposed upon him, he would convey to the Province certain lands therein indicated, and praying that on completing a deed for said lands, he should be set at liberty, and be permitted to return to his family. In answer to the petition, it was resolved, in March, 1701, "that the prayer therein be granted," and Ebenezer Brenton, Esq., the said Major Benjamin Church, and Mr. William Pabodie were appointed "a committee to take care that sufficient deeds of

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conveyance of the lands be made and executed" by the petitioner. In conformity therewith, the deed was duly executed the 27th of November, 1701. The general court by Resolve of the same year, 1701, granted the land, thus acquired, to Captain James Church and certain members of his company of friendly Indians, in consideration of services rendered by them to the Province.

It does not appear that any division was made of these lands among the proprietors till 1707, when they petitioned the general court for an exchange of a portion thereof for others adjoining, which would better accommodate them, and for a division of the whole, to be held in severalty, by them, their heirs, and assigns. The petition was granted, so far as to make the desired exchange of land, and the division thereof; and, on the 27th of November, 1707, the lands were confirmed to them in severalty, and to their heirs, forever; but on the condition that the lands were "not to be assigned or alienated, but continued forever, an Indian Plantation." Under this arrangement the land was surveyed and divided into separate lots, by marks and bounds, and the several lots were respectively assigned, by number, to individual members of Capt. Church's Company, to which division and assignment more particular reference will be made hereafter.

Owing probably to the vagrant habits of a considerable portion of the Indians, to whom these lots were assigned, it appears that but a small portion of them were ever improved or built upon, and that, where improvements were made, it was but to a very limited extent. Several of the proprietors having died without posterity, the general court, in 1763, appointed a committee to cause a new survey of the land to be made and the bounds renewed, with a plan of the same and its subdivisions, and a new assignment of the lots of those who had died and left no posterity. Their report, with that of the surveyor, and the accompanying plan designating the several lots, with the names of the present proprietors of both those who had inherited the same and those who had become so by the new assignment, are in the office of the secretary of State. The report was accepted, and the lands confirmed to the several persons, agreeably to the report, on the 3d day of February, 1764. (See Appendix, C.)

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It appears by the report and accompanying plan, that the plantation contained one hundred and ninety acres and sixty-four rods of land, which, being divided into twenty-eight equal parts, gave to each part, six acres and one hundred and twenty-eight rods. Four of these parts were originally laid out in one lot, marked No. 1 on the plan, for the heirs of Captain James Church, and the remaining parts were each laid out in separate lots, which were numbered from 2 to 25 inclusive. The report of the committee refers to the several lots in detail, giving the names of the original proprietors of each, and the names of the then present proprietors of all such as had owners living, from which it appeared that the original proprietors of nine lots were dead without leaving any posterity. The report proceeds to say :—

"And whereas sundry of the soldiers belonging to the company under Captain James Church have left no posterity, and there being no provision made for Lieutenant Manchester, and twelve others in the same company, the committee have, agreeable to the direction of the court, assigned, to those who have left posterity, the *lotts* of those who had *lotts* assigned to them, and whose posterity is extinct."

All the details of the original laying out, together with the new assignment of the nine reverted lots, will be found in the report of the committee, a copy of which is hereunto annexed. (See Appendix, C.)

From the notes on the plan accompanying the report, it appears that the only improvements which had been made on the plantation up to that time, a period of fifty-seven years from the first assignment of the lots, were as follows :—

Lot No. 1, containing twenty-seven acres and thirty-two rods, had a house thereon, and about three acres under improvement, "and some of said improvements made by Capt. James Church, about fifty years ago."

No. 2. A house, and three-fourths of an acre improved.

No. 4. A house, and half an acre improved.

No. 6. A house, and two acres improved.

No. 7. A house.

No. 9. A house, and one acre "anchently" improved.

No. 10. A house, and one acre and three-fourths improved.

Thus it will be seen, that, on these twenty-five lots, divided among a still greater number of distinct proprietors, after the

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lapse of more than half a century, only nine acres, or less than one-twentieth part of the whole, had been brought under cultivation, and only seven houses had been built, and most of these, we have satisfactory reasons for believing, were only miserable hovels or huts. This state of things does not seem to have been much improved by the addition of the recruits, brought in under the new assignment of the reverted lots; for, at the present time, after the lapse of almost a hundred years, since that last assignment was made, only about twenty-five acres of the land has been cleared, and a part of that is not cultivated by members of the tribe; and of six families residing on the plantation, five receive assistance from the State. So little attention was paid to the property by the proprietors, that the division into lots ceased to be recognized, the dividing lines were forgotten or lost, and the marks which indicated the boundaries became obliterated; and their former position could be determined, now, only by a new survey. Such appears to have been the case as long ago as 1818, when the guardianship was instituted, and the successive guardians have recognized the uncultivated portion of the plantation, or the woodland and pasturage, only as common property. Indeed, the present generation of those on the plantation did not seem to be aware of the division and assignment, by which it was formerly held in severalty, until a claim was recently made by Mrs. Mitchell, a descendant of one of the original proprietors, for the possession of four lots, as the legal heir and representative of that ancestor. This case was brought before the Commissioner, and is the subject of a separate report.

This brief reference to the history of the plantation has seemed necessary, because a petition, signed by several members of the tribe, was presented to the Commissioner, and a copy of it is forwarded herewith, (see Appendix, C,) setting forth, that since the division of their lands, the families of several of the proprietors have become extinct, others have abandoned the lands entirely, and some have claimed rights to the land, (referring to Mrs. Mitchell's claim,) whose title thereto they think is doubtful, and praying the general court that a new division be made, giving a portion to each family or individual who may be found entitled thereto, to be held by him or them in severalty. It is very obvious that the title acquired by the

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several individual proprietors, when the lots were assigned to them in severalty, was absolute, "to them and their heirs forever," that this title cannot be changed, but by their consent, except that the right to sell and alienate the same, which was then withheld, may be conferred on them by the general court, if, in its wisdom, it should ever see fit to do so. If any of the families have "abandoned the lands entirely," their title is not thereby lost, but is merely held in abeyance, and may be resumed, and their right of possession enforced, at any time they choose. Whenever, therefore, a new division and assignment of the lands may be deemed advisable, it must be done in reference to existing rights, and the first step to be taken therein, very clearly, should be to ascertain what those rights are.

The Fall River Indians, as may already have been inferred, were not originally a distinct tribe or community, and the word "tribe," as applied to them, is used simply as a matter of convenience to designate the descendants of those friendly Indians, who served the whites in the company of Capt. James Church, in the war against King Philip, and received from the government of the Province of Massachusetts the land constituting their present plantation, in consideration of those services. They are descendants of the tribe of the Wampanoags, and are distinct from the remaining Indians of the region thereabout (who had a common origin with them) only by the fact of their possession of the plantation, and, in consequence thereof, being placed under guardianship by the government of the State. The facts from which to compile their statistics are very meagre and unsatisfactory. The number of persons named in the document assigning the several shares of their land, in 1764, was seventy-two, but there is reason to believe that several of these had children who were not named therein. From that time forward there appears to be no record, either of their names or numbers, till the visit of the State commissioners to their plantation in 1848, a period of about eighty-four years. In the report of those commissioners, it is stated that "the population of the tribe is thirty-seven," and, of these, "eighteen or twenty, who are considered as belonging to the tribe, do not live on the territory." From the present enumeration of the tribe, which gives them seventy-eight members, it is quite certain that the number in 1848 must have been over eighty, as the deaths

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which have since occurred among those whose names were then returned, exceed the number of births in the same families by not less than five, the deaths having been at least twelve, and perhaps more, while the births in the same period have been only seven. There are at present on the plantation six families consisting of twenty-one persons; of those not residing on the plantation there are nine families and fifty-seven persons, if we include five whose present residence has not been certainly ascertained, and some of whom, possibly, may not be living. Of those not residing on the plantation, it is believed that none except the families of Mrs. Mitchell and Joseph C. Robinson have acquired settlements elsewhere, and all of them, with that exception, would, as members of the tribe, in case of want, look to the guardian for assistance.

This tribe has no municipal or other organization. The entire management of the land, except the trifling portion that is cultivated by the residents thereon, with the income derived from rents and the sale of wood, is in the hands of the guardian, and all expenditures of money derived from those sources, or from the State, for the benefit of the tribe or any of its members, are made by him, at his own discretion. The children attend the public schools, and have the same advantages for education as other children in their vicinity, so far as they choose to avail themselves thereof. The legislature of 1857 appropriated one hundred and sixty dollars, with which the guardian purchased three pews in the North-Westport meeting-house, convenient to the plantation for the use of the members of the tribe.

The quality of most of the land on this plantation is good, estimated to be worth fifteen or twenty dollars an acre, on the average; in this respect much excelling that of any of the other Indian reservations, unless we may possibly except the small one at Webster and a portion of Gay Head. Its location is in the near vicinity of a busy and thriving manufacturing city, where industry and its fruits always command an adequate reward, and, in the midst of an industrious, moral, and intelligent community, whose example ought to exert a beneficent influence. With these advantages in their favor, we might reasonably look, here, for a better state of things,—more comfort, more respectability, and a better development of character than is to be found in any of the other tribes. But it is not so.

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Most of those residing on the plantation are indolent, negligent, and improvident, apparently alike wanting in self-respect and careless of the respect of others—sunk in the destitution and squalor of abject and hopeless poverty—hopeless, because it appears to be willingly acquiesced in, and the determination seems to be wanting even to put forth a hand to remove it. Of the six families on the plantation, five receive aid from the guardian, and three individuals are considered permanent paupers. Six families, not on the plantation, have also been assisted. Generally, the condition of those not on the plantation is better than that of those who are upon it. There is, among them, more self-reliance, more industry, and more ambition to do something, and to be something; and it must be conceded that the plantation system, as here exemplified, is conducive neither to the moral, physical, social, intellectual, or material progress of the people, and should be essentially modified or entirely abolished, as soon as it may be done consistently with the rights and best interests of the tribe and of the general community.

The moral condition of the tribe, as will already have been inferred, is rather low, and intemperance and unchastity are but too prevalent. It is but justice, however, to those on the plantation, to say that the *hardest cases* are among those who do not reside there. In two families, resident elsewhere, there have been twelve cases of bastardy, and, in one of them, it is said, that, of eight children, the paternity was apparently about equally divided between the Indian, negro, and white races. The prejudice of color and caste, and the social proscription to which the colored people are subjected, has a twofold unfavorable effect upon them; first to detract from their self-respect, and so to weaken the moral instincts, and then to throw them into the association of the more dissolute and degraded of other races, where they fall an easy prey to immoral habits. There are, however, in this tribe, as well as the others, instances of those who rise above all the evil influences with which they are encompassed, and maintain a good standing, as worthy and respectable members of the community. It would be a cause for gratification, if it could be said truly that these are increasing, or that there was any decided progress in the general character of the tribe. But, from all the evidence that can be

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gathered, it does not appear that, for the last twelve or fifteen years, there has been much, if any, improvement in their moral and social condition.

The expenditures for the support and relief of the poor of the tribe are met, so far as it will go, by the proceeds of the rent of land, and of wood sold from the plantation, and the balance, whatever it may be, is drawn from the treasury of the State. The amount expended for several years past, and the proportion derived from each of the sources, are shown in the following table:—

	Received from Rents and Wood.	Received from the State.	Total Expenditure.
In the year 1848, . . .	$11 25	$266 72	$277 99
1849, . . .	66 97	309 93	376 90
1850, . . .	268 64	164 27	432 91
1851, . . .	180 86	209 65	390 51
1852, . . .	78 43	314 37	392 80
1853, . . .	68 40	318 99	387 39
1854, . . .	58 56	384 56	443 12
1855, . . .	100 49	467 49	567 98
1856, . . .	192 91	582 56	775 47
1857, . . .	145 94	504 57	650 51
1858, . . .	82 99	373 44	456 43
1859, . . .	73 44	389 35	462 79
Aggregate, for 12 years, . .	$1,328 88	$4,285 90	$5,614 78

It thus appears, that, in twelve years, the whole amount expended for this purpose was $5,614.78, averaging $467.90 a year, of which only $1,328.88 was derived from the plantation, while $4,285.90 was paid by the State. It is worthy of note, that in the three years, 1855, 1856, and 1857, as if from the infection of the times, the amount paid for the support of these Indians was $1,993.96, averaging $662.65 a year, or more than $200 more than on the year next preceding, or than the average of the two following years.

In accordance with the provision of the law, which requires the Commissioner to designate what lands are held in severalty by members of the several tribes, he has placed against the names of several of the members of this tribe, in the table accompanying this Report (see Appendix) the numbers of acres held by them, as returned to him by the guardian. Theirs is,

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however, rather a nominal than a real possession, of a portion, at least, thereof, as the amount actually occupied by them, is as follows: Thomas M. Crank, Persis Crank, Hannah Perry, and William Perry, each about one acre, and Henry Crank about two acres; making, in the whole, only about six acres occupied by residents on the plantation, while all the rest of the cleared land, amounting to about twenty acres, partially covered with bushes, is rented by the guardian for pasturage. The woodland all lies in common, and the several families resident on the plantation, cut fuel from it, as their necessities require. When Mrs. Mitchell claimed her right in the plantation, the guardian assigned two acres of the cleared land to her use, as indicated in the table. On this she placed a house which she purchased and caused to be removed there, for a dwelling for herself and family. But while the work was going on, to fit it for occupation, the hostility which had been manifested toward her, from the first presentation of her claim, broke out in acts of violence. The windows were broken in, and other outrages were perpetrated on and about the house, so that Mrs. Mitchell felt compelled to abandon the intention of making it her residence, and to press her claim before the Commissioner. The house has since stood, unfinished and vacant, and Mrs. Mitchell has never occupied the land set against her name.

If the plantation and guardian system are to be retained at all, it would appear, at first thought, that a tribe so favorably located, as to soil and the general facilities for obtaining a comfortable and respectable living, should be one of the last to be deprived of whatever advantage may be derived from the system. But, the peculiar circumstances that make it desirable, still longer to sustain it with the Cape and Island tribes, do not apply here. Those tribes are, more decidedly, distinct and isolated communities, nearly all the members residing on the plantations, with local organizations, more or less perfect of their own. They generally provide not only for their own wants, but also for the paupers they have amongst them, and are in a state of gradual advancement and improvement, that would be greatly endangered by any radical change. It is quite otherwise with the Fall River tribe. They have no distinct organization. A great portion of them have, for some

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time, been mingled with the general community, their families separated alike from those on the plantation and from each other, while those remaining on the reservation are almost entirely in the incipient or more advanced stages of pauperism; and it is an unquestionable fact, that those who have left the plantation are, as a whole, in a better condition than those who remain upon it. What possible reason can there be for perpetuating or prolonging such a state of things? The commissioners said, in 1849, "the case of this tribe is clearly one in which the benefits of the system of guardianship have not been commensurate with its expenses." This is no less true now than then, and it is believed that the sooner measures are initiated for a change, the better it will be for all concerned. To this end steps should be immediately taken for ascertaining the legal rights of the respective members of the tribe in the plantation, and for determining what portion of it has become common property, by the extinction of the families of the former proprietors. The longer this investigation is delayed, the more complicated the question will become, and the more difficult it will be to ascertain, correctly, the facts necessary for its solution.

HASSANAMISCO INDIANS.

The Hassanamisco, Hassanamessett, or Grafton Indians, as they are variously called, and as known in the legislation of the State, are the descendants of the seven original proprietors of Hassanamisco, or Grafton, where they resided, and where each of the seven families had a reservation. Two or three of these original families have become extinct, and the descendants of some of the others, if any survive, cannot now be traced. At this time one family only remains on the heritage of its fathers, and that family retains less than three acres, out of all their former domain. All the other families have left Grafton, and the greater number, following the current of emigration in that region, have settled in Worcester. In addition to those who would now be entitled to a right in the proprietary fund, if it still remained, are certain others of Indian descent, claiming to be Hassanamiscoes, whose descent cannot be satisfactorily deter-

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mined. They are probably descendants of other Indians than the proprietors of the town, or of some of those whose interest in the fund was extinguished in the last century or early part of the present.

In the tabular list accompanying this Report, those entitled to an interest in the proprietary fund occupy the leading portion, and the others are entered in the supplementary list. By this list, it will be seen that the whole number, recognized as descendants of the ancient proprietors is seventy-three, viz. :—

Families,		20
Males,	33	
Females,	40	
	—	73
Natives,		56
Foreigners,		17
Under 5 years of age,	13	
From 5 to 10 years of age,	6	
10 to 21 years of age,	8	
21 to 50 years of age,	39	
50 to 70 years of age,	6	
Over 70 years of age,	1	
	—	73

The whole number, including those not recognized as descendants of the original proprietors, is ninety, viz. :—

Families,		26
Males,	41	
Females,	49	
	—	90
Natives,		70
Foreigners,		20
Under 5 years of age,	18	
From 5 to 10 years of age,	7	
10 to 21 years of age,	9	
21 to 50 years of age,	46	
50 to 70 years of age,	9	
Over 70 years of age,	1	
	—	90

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Complaint has been made to the Commissioner that the government of the Province of Massachusetts, early in the last century, had taken into its own keeping, a large fund, belonging to the tribe, and had intrusted the same to the keeping of certain agents, trustees, or guardians, and that said agents, in the appointment of which the Indians had no voice, and for whose mismanagement they ought not to be made sufferers, had applied portions of said fund to their own use, and otherwise had squandered a large portion thereof; for which loss, they deem they have a just and equitable claim on the Commonwealth. The investigation of this matter has caused a great amount of labor and research, in the course of which, all the difficulties in ascertaining the facts in the case, referred to in the body of the Report, have been encountered; and on some points, which will be alluded to hereafter, a long and patient examination failed to lead to any satisfactory result. Enough, however, has been satisfactorily established, to show that the complaint is not made without cause. This inquiry will necessarily require a more minute and detailed statement, in relation to the affairs of this tribe, than has been deemed necessary respecting the others, the more especially, as some members of it, now in years and needing aid, feel that they have a claim to it, as a personal *right*, not depending on those general principles of justice and humanity, which dictate the aid which is rendered by the State to some of the other tribes.

Early in the last century, seven families of the Hassanamisco tribe possessed the territory known as Hassanamisco, constituting the whole or the most important part of the present town of Grafton, in the county of Worcester. At that time, no sale of land by the Indians to white men was valid, without consent of the general court. In the year 1725, the general court authorized the sale of this territory, and a subsequent Resolve, in 1727, fixed the value at £2,500. Whether this was so much "lawful," ($3.33⅓ silver to the pound) or whether it was "old tenor," is not ascertained. "Old tenor" was based on the "bills of credit" which were issued by the government, and represented no fixed value, but fluctuated in their depreciation, according to the amount in circulation. At the time of this sale this depreciated currency was equivalent to seventeen shillings for an ounce of silver, and the ounce of silver was worth

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about $1.18\frac{18}{100}$ in gold. If the sale was reckoned in "old tenor" it was equivalent to $3,270.22; if it was "lawful," it was equivalent to $8,333.33 standard coin. The territory comprised about 7,500 acres. The writings were completed on the 19th of March, (old style) 1727.

By the terms of the sale, it was stipulated that forty English families should settle on the territory, each of whom should, within three years, build a good habitable house, and break up and fence in, at least four acres, and that they should, within that term, build and finish a decent meeting-house for the reception of both English and Indians. They were bound, further, to separate twenty acres of land, for a school, forever, and to build a suitable school-house in which the Indian, as well as the English children should be received and taught; to set forth a lot of land, equal to the other allotments, to the first ordained minister, and constantly to maintain and duly support a minister and a school-master among them; all without charge to the Indians. A reserve was also made of a dividend or allotment of land to each of the Indian proprietors, equal to that made to the English proprietors, comprehending their improved lands, and also one hundred acres in addition, to said Indian proprietors, their heirs and assigns, forever. Trustees were appointed by the legislature, whose duty it was, to receive said sum of £2,500, and invest it as a permanent fund, the interest thereof to be paid out to the Indian proprietors, from time to time, as the general court should direct, and to render an account of their proceedings therein, annually at the May session. These trustees invested the proceeds of the sale in bonds on the land, and laid out the lots, and presented a report of their proceedings therein to the general court. This report was accepted June 18, 1728.

In the absence of evidence on the point, it will be assumed that the sale was reckoned in old tenor, that position being most favorable to the government, and least so to the Indians, and that, consequently, the value to be received was at that time equivalent to $3,270 in standard coin. The record book of the trustees shows payments to have been made to the Indians, from time to time on account of the interest received by them, and also an account of Indian lands rented out, till April 9–10, 1745, when, in the language of the record, "the trustees met

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agreeably to notification put in the public prints, in order to receive the interest due, and to *exchange* the bonds; some of which we exchanged, and, for every 28*s*. 8*d*. old tenor, due as principal on a bond, we took one ounce of coined silver of sterling alloy—and, in that proportion, we agreed to exchange *all* the bonds."

By this arrangement the fund was reduced to $1,939.33, making a loss of $1,330.89. No blame attaches to the trustees for this loss, as, being the agents of the government, they would have been obliged to receive the government securities at their nominal value, in payment of the bonds, had they been tendered, and they probably made the best bargain that they could, under the circumstances. But, as the government, on the hypothesis most favorable to itself, received what was equivalent to $3,270.22 in standard coin, and invested it in its own way, without any agency of the Indians, it is difficult to say on what principle they should seek to turn them off with only $1,939.33, or subject them to a loss of more than $1,300, because, in the mean time their own bills of credit had depreciated to that extent, owing to the excessive issue, and refusal to pay what was promised. The sum thus abstracted from the fund, at compound interest at the rate of six per cent., would amount, now, at the end of one hundred and fourteen years, to *more than a million dollars*, and, at simple interest to between eight and nine thousand dollars; the former sum sufficient to place all that remain of the tribe in independent circumstances, and the latter, if put to interest as a permanent fund, sufficient to yield the requisite relief, annually, to all the poor and needy among them.

On the principal of the fund, thus reduced, the trustees annually paid over to the several Indian proprietors, the interest, amounting to £34 18*s*. 2*d*. lawful, equivalent to $116.34, up to the 17th of March, 1772. From that time forward, there is no record, for twenty-four years, till 1796, but, by the records of the general court, it appears that on the 17th of January, 1776, upon petition of Eliza Sampson and others of the tribe, it was "*Resolved*, that whereas, Hon. Artemas Ward, Esq., one of their present guardians, is necessarily employed in the continental service, and the others, [Timothy Paine and Ezra Taylor, Esqs.,] have neglected to relieve those Indians,—it is become

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necessary that new guardians should be appointed," &c., and on the twenty-sixth of the same month, Edward Rawson, Stephen Maynard, and *Deacon* Willis Hall were chosen guardians. In April the then "present trustees" were directed "to make inquiry, as soon as may be, conveniently, whether the five pounds and interest, as mentioned by the petitioner, (Elizabeth Sampson) be really due from the former trustees, and, if so, that they improve proper methods, as the law directs, for the recovery of debts, to procure said money for the use and benefit of the petitioner."

On the 5th of November, 1785, on the petition of Joseph Aaron and the other Indians, complaining, that, for the last seven years, they had not been paid one-quarter part of their interest money, it was "*Resolved*, that the said trustees be, and they hereby are directed to lay their accounts respecting said Joseph and others before the general court, on the second Wednesday of their next sitting, for examination." There is no record that their accounts were presented at that time, and it appears that the difficulty was not removed, for, on the 29th of February, 1788, a report was made to the general court, as follows:—

"The committee of both houses, appointed to go to Grafton to settle the matter between the Grafton Indians and their trustees, have attended to that service, and notified all parties, and, after a full hearing of the matter, have settled the accounts between them, and are unanimously of the opinion, that the said trustees have done as well in all respects, by the said Indians, as the nature of the matter would admit of."

On the 4th of March, 1788, a Resolve was passed, authorizing the trustees to pay to Esther Freeborn, "her dower," and, by subsequent records, it appears that her portion, being three-eighths of an original share, (a share being one-seventh of the whole fund,) was paid, and her right in the remaining proprietary fund was extinguished.

On the 14th of June, 1790, the two houses chose, in concurrence, Benjamin Heywood, Esq., and Capt. Isaac Harrington, trustees, "in the room of Willis Hall, resigned, and Capt. Stephen Maynard who has removed out of this Commonwealth." There is reason to believe that Deacon Hall was induced to resign, by dissatisfaction with the doings of the other two

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trustees, for it appears, that they had become individually liable for a large portion of the fund they held in trust, as an execution (now on file) was obtained against one of them, in April, 1794, for nearly four hundred dollars, which was not finally settled till after the lapse of nearly eight years, while the other owed a much larger sum, for which nothing was ever realized, but which was totally lost to the fund.

In 1796, the record again commences, Benjamin Heywood, Isaac Harrington, and Edward Rawson being trustees. At this time it appears that so large a part of the remaining fund had become unproductive, that only fifty-eight dollars and six cents was received as interest money that year, and only fifty-one dollars and forty-one cents in 1797. In 1803, a debt against one of the trustees having been collected on execution, the fund amounted to $1,043.85½, exclusive of the right of Esther Freeborn, which had been paid in full, and excluding also, in the language of the record, "a desperate debt against Capt. Stephen Maynard, deceased," the amount of which is not specified, but which is ascertained by comparison of other portions of the record, as will be indicated hereafter.

The interest on the amount last named, $1,043.85½, was regularly received and accounted for, till 1807, when the right of Submit Wamsquam, being three-eighths of an original share, was extinguished, pursuant to a Resolve of the general court, by the payment of $118.16½, leaving the *available* fund $925.69, exclusive of the debt of Capt. Stephen Maynard, before mentioned. In 1809, the right of Joseph Aaron, being three-eighths of an original share, was extinguished by authority of the general court, by the payment of $118.16½, so that the productive fund was further reduced to $807.52½; and, in 1813, it was again reduced to $413.62½, by the payment to the heirs of Abigail Printer, alias Burnee, deceased, of $393.90, by which their right to two and one-half shares of the original fund was extinguished.

In ascertaining the amount of the debt due from the estate of Capt. Maynard, we find, that, in 1807, Eli Whitney, Esq., one of the two remaining trustees, died, and his place was not filled by another appointment, so that Judge Heywood was left as sole trustee. In rendering his annual statement to the general court, in the February following, Judge Heywood accounted

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for $2,253.18½, as the amount of the fund in his hands. His record of the same year, of the interest received and paid out to the Indians, says, the proprietary fund "after deducting a desperate debt due from Capt. Stephen Maynard, deceased, is $925.69, and one year's interest is $55.54, which was divided according to the respective rights of said Indians," &c. The former sum, being the whole amount of the fund, and the latter, being the amount, *exclusive*, of the debt of Capt. Whitney, when deducted from the former, shows that the debt was $1,327.49½. This sum, at compound interest, would now amount to above $27,000.

On the 8th of February, 1814, Judge Heywood was discharged from his trust, at his own request, and Asa Goodell, of Millbury was appointed in his stead. From the time of Judge Heywood's last record, September 6, 1813, till 1828, no record of the doings of the Trustees is found. In the latter year, Cyrus Leland, of Grafton, was appointed trustee, and on the 28th of August of that year, a memorandum was furnished to him by the late trustee, Jonathan Leland, Esq., of Sutton, accompanied by a certificate, that said memorandum contained an account of the personal property, lately in his hands, belonging to the Grafton Indians. This memorandum was as follows:—

Phillips family, original fund,	$111 50			
One-half Otis Newman's original fund, due from him, .	28 00	—$139 50	Int.,	$8 37
Brown family, original fund,	111 50			
Avails of land sold, . .	310 00	— 421 50	"	25 29
Lucy Gimbee, original fund, .	27 83			
Avails of land sold, . .	80 00			
One-half O. Newman's original fund, due from him, . .	27 83	— 135 66	"	8 15
Moses Gimbee, original fund,	27 83			
Avails of land sold, . .	90 00	— 117 83	"	7 07
Polly Johns's family, original fund,		55 83	"	3 35
		$870 32		

By this memorandum, it will be seen that only $390.32 of the original fund is accounted for, as remaining, and the bal-

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ance, $480, going to make up the principal of the fund as it existed at that time, viz., $870.32, was the avails of lands belong to three of the families—the Brown family, and Lucy and Moses Gimbee, which had recently been sold. The Phillips family owned real estate at that time, and it has been sold by leave of the legislature, within a few years past, and the proceeds were received by Gilbert Walker, of Worcester, whose wife is the only heir of that family now living.

A schedule is also on record of the property received by Mr. Cyrus Leland from the late trustee, consisting of certain notes of hand, amounting, with the interest due on them, to April 1, 1828, to $962.21, or $91.89 more than the principal of the fund, with which the trustee charges himself (less three cents, caused by a mistake in adding) as the *disposable* fund to be paid out to the several Indians, according to their respective shares in the fund. Mr. Leland died in 1831 or 1832, and Thaddeus Read was appointed administrator of his estate, and Moses Roberts, trustee of the Indians, in place of said Leland. It appears that on settlement of the accounts of the trust, at the probate office, that the balance due the Indians, in the hands of the administrator, was, $1,005.72. This was cancelled as follows:—

Sundry notes turned over to the trustee, amounting (principal and interest, cash to April 1, 1832,) to	$886 63
Cash paid the trustee, ...	119 09
	$1,005 72

No further record appears till July, 1841, when Mr. Roberts rendered his account to Pliny Merrick, Esq., district-attorney, who had been authorized to adjust the same.

In the account he charges himself with the money received of the former trustee, ...	$119 09
Cash collected on notes, ...	161 91
	$281 00
And credits himself with his services, nine years, cash paid out, "&c., &c., &c.,"	$190 96
Cash paid P. Merrick, to balance account, . .	90 04
	$281 00

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Thus it appears, that on the notes received in 1832, amounting then to $886.63, only $161.91 had been collected, as principal or interest in over nine years, while the simple interest on them alone is, $496.04, up to that time.

Notes, April 1, 1832, ...	$886 63
Interest, to July 27, 1841, ...	496 04
	$1,382 67
Amount collected on Notes, and accounted for, .	161 91
Balance, ...	$1,220 76

This balance does not appear ever to have been accounted for. Charles Brigham, Esq., of Grafton, was appointed in 1841 to succeed Mr. Read, as trustee, and states, in rendering his account, that he was appointed without any funds, and accounts only for money received from subsequent sales of land, and from the treasurer of the Commonwealth. The notes in which the funds were invested, amounting, as above, to $1,220.76 in July, 1841, and which, at simple interest only, would now amount to over $2,500, are supposed to have become worthless, as several of the promisors are known to have been insolvent some years previously. There appears to have been great neglect of duty on the part of the trustees, both in making investments, without adequate security, and in omitting to collect the notes, or to have them properly secured, when it had become obvious that they were doubtful in their character.

This investigation, which has required no little time, labor, and patient research, if it result in no other good, will show, at least, that thus far this tribe has been no tax on the government, and if, hereafter, their aged or infirm should need assistance, they would present a claim, the force of which could hardly be resisted. The State, in its sovereign capacity, took their property into its keeping, and has suffered it to be squandered and lost. To recapitulate :—

1. The government originally received what was equivalent to $3,270 in standard gold or silver coin, and afterwards, to wit, in 1745 through its agents, in effect, substituted therefor, its own depreciated paper, making a loss thereon of $1,330.89

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which was taken from the fund, and, for which, the Indians have received nothing, either as principal or interest, to the present day.

2. Subsequently to the above, and between the years 1772 and 1796, the trustees permitted one of their number to become indebted to the fund on his own personal obligation, and, as would appear, without other security, in a sum, which, in 1807, amounted to $1,327.49½. The said trustee became insolvent and neither principal or interest of the claim was ever paid.

3. Prior to July 27, 1841, the small remnant of the original fund, together with the proceeds of the sale of the land of some individuals of the tribe, amounting, at that date to $1,220.76, had been invested by the trustees in such securities, that neither principal nor interest was ever paid.

It should be remarked of the latter, that the notes, when given, were probably supposed to be good, and so, perhaps they were, for a short term, but they were not first class securities, or such as funds should ever be invested in, that are held in trust. They were, moreover, unreasonably neglected by the trustees, and, in some instances were allowed, while yet collectable, to run many years without even the interest being paid, and finally to remain, uncollected, till they became worthless.

The question arises, what is the obligation of the State, under these circumstances? The Indians say, very naturally, "Give us our own. You took of us £2,500, disposed of it as you pleased, without any agency of ours; you have repaid us only a part of the principal and but a small part of the income of it. The State is rich and powerful, we are few, poor, and weak, and we ask not of your riches, but simply our own, which you have taken and withhold from us, or at least the income of it, for the sustenance of those amongst us who have not other means to live." If it is objected that the property has been lost, the ready answer to that, is, "If it is lost, it was not by our agency, but yours, and you have no right to make us the sufferers by your misdoings."

The State itself has sanctioned the principle contended for by the Indians, and admitted an obligation growing out of the loss of this property. By a Resolve of April 9th, 1839, the sum of $50 per annum, for ten years was appropriated, to be placed in the hands of the judge of probate, of Worcester County, to

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be distributed at his discretion among the members of the tribe, as their wants or necessities might require. This grant was based on the ground of the loss of the fund by the agent of the State. In 1849, by chap. 50, of the Resolves of that year, the same amount was continued for ten years longer, on the same conditions. In 1858, a further sum of $200 was placed in the hands of the judge of probate of Worcester County, to be distributed in the same manner, and, in 1859, on a petition of Gilbert Walker, praying for compensation for the support of Benjamin Phillips, one of the tribe during his last illness, a Resolve was passed, allowing to the tribe, "the sum of one thousand dollars to be paid over to the judge of probate and insolvency of the County of Worcester, and by him invested or disbursed at his discretion, for their benefit, in such manner as shall most effectually meet the present or future wants and necessities of the surviving members of said tribe of Indians, and in payment of the claim of Gilbert Walker, or of any other claims which may exist for their former support." The claim of Gilbert Walker here indicated, amounted to about $300, and was paid from the sum granted.

The committee of finance which reported this Resolve based their report in favor of it, expressly on the ground of the obligation of the State, growing out of the loss, by its agents, of the Indian fund. This last grant, it will be perceived, is considerably less in amount, than the sum last lost to the fund, while the former grant of fifty dollars a year, for a limited period, is not nearly equal to the current interest thereon during the time, to say nothing of the accumulated interest for a long period preceding. And it is worthy of note, as showing the loose manner in which the special legislation in relation to the Indians has been transacted, that while these grants have been based on the obligation growing out of the loss of the fund, they have been made in terms, and on conditions, inconsistent with their application to meet that obligation. The fund was not a common one, belonging to the tribe, but a specific one, belonging to certain individuals in distinct and well-defined proportions, as much as do the stock and funds of a bank, a railroad, or an insurance company; and other members of the tribe had no more right or interest in it, than the members of any other tribe, or than their white neighbors, yet the grants

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have been made, as if it was a common fund, to be applied to the general purposes of the tribe, as the circumstances or necessities of its members might require.

Having, as he trusts, presented this subject in its true light in a manner, as he hopes, that will make it better understood, than it has been by our legislators in years past, the Commissioner feels that he has done all that is required of him, without recommending what definite action should be had thereupon. To judge of that, is the special province and the right of the legislature, and he feels sure that the representatives of a free and enlightened people, acting in a government that was instituted to guard and protect the rights of the weak, and to establish justice, will not perpetuate a wrong, especially against a people, who, by the action of that government, for no wrong of theirs, have been degraded from the condition of citizens to that of subjects. It may be pertinent to add, in this connection, that, while appropriations by the State for various purposes, have been made for almost all the other tribes, some of them requiring a considerable amount every year, this tribe has never been a tax upon the government for one cent.

In their personal and social condition, their intelligence, education, and general character, the Hassanamiscoes will compare favorably with any other tribe in the State. They are, as a whole, an orderly, industrious, and moral people. Only one case of habitual intemperance is known to exist among them, and that is a man not an Indian, who belongs to the tribe only by having intermarried with one of their women. Within the last twenty years, but one case of illegitimacy has occurred, and that was under a promise of marriage, and the young woman has, aside from that occurrence, sustained a good character. In consequence of that, she has required assistance from the town; and this is the only case known, where any member of the tribe has received such aid. Several of them are now growing old, and one of them has already received assistance from the appropriation in the hands of the judge of probate and insolvency, and will require constant aid from some source, to enable him to sustain life. About $700 of the last year's appropriation remains, and no more will be required, at present, if the judge is satisfied that he can draw on the principal thereof for such purposes.

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The reservations that were made for the Indians, at the time of the original sale to the proprietors of Grafton, have all, with the exception of about two and a half acres, been sold at various times, by leave of the legislature, mostly for the payment of debts or the support of the proprietors. The proceeds of the sales of the last remnants, belonging to two or three families, were invested by the guardian in the notes which proved worthless, and were thus lost. The last real estate belonging to the Phillips family was sold at a more recent date, and realized, with the wood that had previously been sold from it, a considerable sum, which has been invested in real estate in Worcester by Gilbert Walker, the husband of the last surviving heir of the family. The sale last made, was of the land belonging to John Hector, the proceeds of which were invested by the guardian in a place costing $700, for Hector's residence in Worcester. Andrew C. Brown has a place of two acres, in Holden, worth $400 which was deeded to the guardian, in trust for him. Elizabeth Brown owns a place of about the same size in Framingham, worth about $900, on which she owes about $400. The land remaining unsold in Grafton, belongs to Sarah Maria Cisco, wife of Samuel Cisco, (colored.) It has a small dwelling-house on it, and the whole property is worth some $600 or $700. This is believed to be all the real estate in Massachusetts belonging to the tribe. It is claimed that there is a tract of woodland, lying in New Hampshire, which was owned by Moses Gimby, deceased, and of whose estate John Hector is the surviving heir. There is a deed on record, in the registry of deeds of Cheshire County, of such a tract, and it is understood that there is no record of any transfer of the property by Gimby. But, whether his title was a good one, or whether, if good, it may not have been subsequently lost, is unknown. The subject was brought before the Commissioner by Hector, but he failed to substantiate his claim for want of pecuniary means to pursue the investigation. (See Appendix, D.)

This tribe, having no common territory, but living scattered among other people of their respective vicinities, have, of course, no municipal, educational or religious organization, but their educational and religious advantages are the same as those of others among whom they live, and so far as is known, they

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avail themselves thereof about in the same proportion that other people do. Probably about one-half of them are citizens in the towns where they reside, while the remainder have retained their legal relation of wards of the State.

But little trace of Indian descent is apparent in the members of this tribe. It is most marked in the few who have mixed chiefly with the whites, yet some of these have no perceptible indications of it, and have become identified with the white race. The remainder of the tribe have the distinguishing marks of African descent and mixed African and white, of various grades, from the light quadroon and mulatto, to the apparently nearly pure negro, and, in every successive generation the slight remaining characteristics of the race become less apparent.

There is little property held by individuals of this tribe, aside from the small parcels of real estate already referred to. The men, being mostly mechanics and laborers, generally obtain a comfortable support for their families, and live much as other people do in their condition of life. Under the circumstances thus presented, no good reason is apparent, why the right of citizenship should not, at once be granted to them, and they be placed on the same legal footing as other inhabitants of the Commonwealth.

THE DUDLEY INDIANS.

The Dudley Indians, so called, are a remnant of that portion of the Nipmugs, called the Pegan tribe, which formerly inhabited the track of land in Worcester County, now known as Charlton, Dudley, Sturbridge, Oxford, Southbridge, and Webster, with portions of some of the adjoining towns. These Indians were visited in July, 1663, by the Apostle Elliot, accompanied by Hon. Daniel Gookin, who informs us, that "the seven new praying towns, in the Nipmug country, under the jurisdiction of Massachusetts, began to harken to the gospel about three years since, or thereabouts." They were visited again in September, 1674, for the purpose of settling teachers and establishing civil government among them. The towns visited were:—

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Manchage, (now Oxford) containing	. .	60	persons.
Chabunakongkomun, (Dudley) "	. .	45	"
Manexet, (N. E. part of Woodstock,*)	containing	100	"
Quantisset, (S. E. part of Woodstock)	"	100	"
Wabquisset, (S. W. part of Woodstock)	"	150	"
Packachoag, (S. part of Worcester & Auburn)	"	100	"
Warunlug, (Uxbridge)	"	50	"
		605	persons.

When the Indians made sale of their lands, they reserved two plats of each five miles square, which were laid out in 1685, one of them in Woodstock, Conn.; the subsequent disposition of which is not known, and the other comprised the territory which afterwards constituted the town of Dudley. This last was sold by order of the legislature, in June, 1797. The consideration of this sale was, the relinquishment of a debt of $300, then due from said Indians to their guardian, a lot of land situated in Dudley, (now Webster,) containing twenty-six acres and fifty-eight rods, being the same on which the Indians resided till recently, and which is still occupied by them, and the further sum of $1,667, to be paid to the treasurer of the State, the interest of which was to be paid over to the guardian of the Dudley Indians, for their own use and support.

Whether the fund of $1,667, which was paid into the treasury, became merged in the general funds of the State, or was kept distinct till it was exhausted in the support of the Indians, does not appear from any authority at hand. Unfortunately, no records are to be found, of the doings of the guardians of these Indians, from which the facts in reference to this question or to the general concerns and statistics of the tribe could be drawn. It may, however, be safely assumed, that whether it was kept a distinct fund or not, the Indians must have had the full benefit of the whole fund, as the average annual payments, on their account, for many years past, largely exceed the interest of that sum.

The whole territory of the tribe now consists of the before mentioned lot of twenty-six acres and twenty-eight rods, and a lot of one acre bought for their use by the Commonwealth in

* Woodstock was then in Massachusetts jurisdiction.

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1857. Heretofore the families were located on the larger lot. It is situated at some distance from any public highway, and the buildings, being in a small clearing, surrounded by woods, and thus obscured from public observation, became a resort for the idle and dissolute of the country about, to the great detriment of morals and annoyance of the sober and orderly portion of the community. Their buildings having become so dilapidated as to require extensive repairs or rebuilding, it was thought best to transfer them from that location, and bring them more directly under the public eye, where a healthy public sentiment could have its sanitary influence, and where the civil authority could have a more direct supervision over them. To that end, the lot of one acre was bought. It is situated on the public highway, about half a mile from the principal village in Webster, and about one-fourth of a mile from the lot they had hitherto occupied, and convenient of access to it. On this was erected a good building of five tenements, for their occupation, to which they were removed, and their former habitations were demolished. The experiment has been measurably successful—the irregularities and disorder which formerly prevailed among them, have, to a considerable extent, been suppressed, and it is to be hoped, that, under a careful supervision, such as has been exercised over them by their present guardian, Asher Joslin, Esq., the evils which have been such just cause of public complaint and reproach, may be still further mitigated.

The whole number belonging to the tribe, including those, as well, who have gone out into the community, and by obtaining a legal settlement and exercising the rights of citizens, have abandoned the *legal* condition of Indians, as those who have not obtained a settlement or exercised those rights, and those, who, remaining on the reservation, are to a greater or less extent, dependent on the State for support, so far as has been ascertained, is ninety-four, viz. :—

Families, ...		19
Males, ...	41	
Females, ...	51	
Unknown, ...	2	
	—	94

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Natives,		83
Foreigners,		11
Under 5 years of age,	17	
From 5 to 10 years of age,	9	
10 to 21 years of age,	18	
21 to 50 years of age,	35	
50 to 70 years of age,	9	
Of 70 and over,	4	
Unknown,	2	
	—	94

Those of 70 and over, are of the ages, respectively, of 70, 75, 80, and 85. Of the foregoing, five families, consisting of thirteen persons, reside on the reservation, and receive support or assistance from the State. They are:—

Males,		6
Females,		7
Under 5 years of age,	1	
From 5 to 10 years of age,	1	
10 to 21 years of age,	2	
21 to 50 years of age,	5	
50 to 70 years of age,	2	
Of 70 and over,	2	
	—	13

Of those who do not live on the reservation, three families, consisting of nineteen persons, including, in two of them, foreign husbands of Indian women, reside in neighboring towns, and, if they should need assistance,—which is quite probable,—would, as members of the tribe, look to the State for relief, having never acquired a settlement in the towns, or exercised the rights of citizenship. The remainder of the tribe, as will be seen by the accompanying table, are scattered in various places, and some of them could not be found, nor their present residence be ascertained. These latter have long ceased to identify themselves with the tribe, and more or less of them, it is probable, have acquired local settlements.

Two, only, of this tribe, claim to be of pure Indian blood, and of the validity of their claim, there is much reason to doubt. There are several others in whom the Indian blood is so strongly characterized as to indicate its predominance, but

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by far the larger portion are so mixed with foreign blood, that the traces of the Indian race are slightly or not at all discernible. A few are nearly white, but most of them have the general appearance of Africans, either pure or with a greater or less admixture of white blood. In their personal characteristics, habits, manners, and modes of life, there is generally nothing to distinguish them from the mass of our colored population, with whom they are mostly commingled. A very few, in whom the native blood predominates, have the roving disposition and unsettled habits so characteristic of the race. This trait is remarkably prominent in one of the families. Five of them, all of whom had been heads of families, and one of them having, at this time a family of minor children, could neither of them be found, although the several places where they had all resided within from one to four years past were ascertained.

As will be inferred from what has already been stated, this tribe has no municipal, religious, or educational organization. The greater portion of them, scattered in various towns, belong to those municipal organizations, and have the benefits of religious and educational institutions, such as are common to those in their condition of life. Those who reside on the reservation, although subject to the legal disabilities of Indians, enjoy the benefits of the public schools of the town, and have the usual opportunities for religious worship and instruction, so far as they choose to avail themselves thereof.

The moral condition of that portion of the tribe residing on the reservation has already been alluded to; in connection with the notice of the change made in the location of their residence, a few years since. But the Commissioner does not feel that he would be justified, in view of statements that have been made, and impressions that have to some extent prevailed in the community, in leaving the matter, without a little further explanation. The report of the commissioners, in 1849, says: "This *tribe* have reached a lower deep than any other in the State. A *few* get an honest living by cultivating their land, and by going out to work. The rest subsist on the bounty of the State and by prostitution. They have no schools and no preaching, are ignorant, improvident, and degraded to the lowest degree."

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This statement, to say the least, does *the tribe* great injustice, and could have been based only on information of an unreliable character. The members, both on the reservation and off of it, have the same advantages for education in the public schools, and for religious instruction, that other people do, in the communities where they respectively reside, and the whole are of as much average intelligence as those of the other tribes in the State. The remarks were true, to a certain extent, as affecting the *moral* standing of a *small* portion of those residing on the reservation, where, formerly, intemperance prevailed to a considerable extent, and, in some instances, its not unusual concomitant, licentiousness, carrying in their train moral and social degradation. The writer of this would not seek to disguise or palliate these evils, fearful as they are, where they do exist, and so much to be deprecated. He only wants the truth, and the whole truth be known, and that this tribe should stand before the world, positively and relatively, in its true character. He does not believe, that, eleven years ago, there was much more, if any, of moral and social degradation in it, than in some of the other tribes, and he is sure, from personal observation, that the external evidences of its prevalence, at the present day, are not so great as in some others. The use of intoxicating drinks, with the evils that flow therefrom, still prevail to too great an extent on the reservation, yet, in this respect there has, unquestionably been considerable improvement, and the present guardian is deserving of special commendation for the firmness and decision he has manifested in promoting this desirable reform.

The whole number of the tribe, reported by the commissioners in 1849, was forty-eight, of whom it was stated that about one-half resided on the reservation. The number now residing there is thirteen, a reduction of nearly one-half in eleven years. Of those remaining, seven vary from 40 years of age to 75, two of them being unmarried females between 40 and 50 years of age. There is but one young married couple, and but four children, two of whom are boys of 17 and 12 years of age. The former of these earns his own living and the latter will soon be able to earn his. Under these circumstances, no good reason can be perceived, why all who are now minors should not, as fast as they come of age, be placed on the same legal

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footing, as all other residents of the State, who are born upon its soil. It evidently would not be just, toward the towns where they reside, to throw those who are now adults and in a state of actual or impending pauperism on them for support.* But the youthful portion of the tribe, growing up with the knowledge that they must provide for themselves, or take their chance with all other paupers, and that they have no reservation to go to, when either from misfortune, shiftlessness, or an evil and immoral course of life, they may be in want, will scatter themselves abroad in the community, seeking profitable employment wherever it may be found, and will thus, not only diminish the evil of having congregated together, numbers who do not feel, so strongly as they should, the duty of self-reliance and the responsibility of self-support, but will, by such distribution, equalize whatever burden may hereafter be incurred by the public for their maintenance.

Of those residing on the reservation, one is entirely blind, between 40 and 50 years of age, three others are old and infirm and can do little towards their own support, three others are too young to labor, and some of the others are more or less infirm—all requiring partial assistance, which has been given from time to time, by the guardian, as seemed necessary. Their fuel is one of the heaviest charges. Formerly there was wood upon the lot, which furnished what they wanted and contributed something towards their support, but this is now exhausted.

The families on the reservation all reside in one building which was erected in 1857. It contains five tenements, entirely separated from each other by permanent partitions. It is kept in neat and decent order both within and without.

The expenditures of the State, for the support of this tribe, since the report of the former commissioners, in 1849, have been as follows:—

* This remark is made, and a similar one in the notice of one of the other tribes, in consequence of a fear being expressed by town officers, at the public hearings, both in Webster and Gay Head, that the State was about to place the Indians on the same legal footing as other inhabitants, and, at the same time, to throw the charge of such as might, now or hereafter, be in want, upon the towns where they might happen to reside.

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In 1850, for support during the year 1849,							$327 12
1851,	"	"	"	1850,			282 63
1852,	"	"	"	1851,			304 13
1853,	"	"	"	1852,			365 12
1854,	"	"	"	1853,			329 87
1855,	"	"	"	1854,			439 38
1856,	"	"	"	1855,	$107 33		
1856,	for support	to	February,	1856,	439 74		
							547 07
1856,	"	"	to	August, 1856,	$571 08		
1857,	"	"	to	Jan'ry 27, 1857,	693 38		
							1,264 46
1857,	"	"	to	July 16, 1857,	$683 02		
1858,	"	"	to	January 1, 1858,	406 13		
							1,089 15
1858–9,		"	to	January 1, 1859,			757 94
1859–60,		"	to	January 1, 1860,			731 25

This is exclusive of the salary of the guardian, the amount of which, there are no means at hand of ascertaining for a portion of the term. For 1858 it was $95.53; for 1859, $100.

In addition to the amounts paid for the salary of the guardian, there should be added to the above—

For one acre land bought in 1857,	$75 00
For block of houses built on the same,	1,500 00
For fencing and improving the lot in 1859,	400 00

The exhaustion of the wood on the reservation took place in 1855, and the expense for fuel since that time has been about $150 a year, and the increased expenditures since that time are, to that extent, chargeable to that cause.

THE YARMOUTH TRIBE.

This tribe, if tribe it may be called, which has no organization, or scarcely any characteristic by which to distinguish its members from the mass of the community with which it is intermingled, reside mostly in Yarmouth, a few being settled

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in the neighboring towns. The whole number, with the exception of a branch that has become merged in the Herring Pond Tribe, is *one hundred and twenty-six*, as follows:—

Families,		23
Males,	66	
Females,	58	
Unknown,	2	
	—	126
Natives,		105
Foreigners,		21
Under 5 years of age,	17	
From 5 to 10 years of age,	24	
10 to 21 years of age,	36	
21 to 50 years of age,	45	
50 to 70 years of age,	3	
Of 70 years and over,	1	
	—	126

These are all descended from one man, who was born in Yarmouth in the first half of the last century, some one hundred and fifteen to one hundred and twenty years since, the son of an Indian mother and white father. One of his daughters married a Herring Pond Indian and removed to that plantation, where she has many descendants living at this time. With this exception, nearly all of his descendants have intermarried with whites, down to the present day, so that they are substantially merged in the general community, having their social relations with white people, with the exception of one or two families. By the accompanying tabular list (see Appendix, A,) it will be seen that in all the families, in which both heads are living, there are only two in which one of them is not pure white, and it may be added, that the one having the Indian blood is usually so little colored, that it would hardly be noticed by one not acquainted with the fact. Some of them have but one-sixteenth part of Indian blood. Of the two widows, one was the wife of a white man. The other was a Marshpee Indian, her husband one of the Yarmouth Tribe; and her associations are with the colored population.

These facts are presented, as pertinent to our subject, from the lesson they teach. Wherever the Indians have

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been subjected to the full influence of the unholy prejudice of caste and race, to consequent social proscription and civil disability, their economical, social, and, usually, their moral condition have remained in a comparatively low state, scarcely advancing, under all the genial influences which may have been otherwise brought to bear upon them. Under this withering blight, too, they have hardly been able to keep their own numbers good from generation to generation, but, in most cases have actually diminished, and are less numerous, now, than they were a century or a century and a half ago. But, the Yarmouth Tribe, situated where, from some cause, that prejudice appears to have been less active, and the proscription less exclusive, and where, too, their civil rights were conceded to them, present a very different aspect. Instead of remaining stationary, or receding in numbers, they have, in the course of a century, increased from one person to more than thirty families (including the Herring Pond branch) and one hundred and fifty individuals. Instead of a proscribed class, seeking a precarious support, to eke out a comparatively comfortless existence, with their hands raised to the legislature, now imploringly, for aid and relief, and now deprecatingly, lest some new disability or wrong should be inflicted on them, we find them in possession of their civil rights, nearly all in a condition of domestic ease and comfort, the peers of the community about them; not in high social circles or advanced political positions, it is true, but with the barriers removed which would prevent their aspiration to them, with the prize in view, as the reward of their own personal energy, industry, and perseverance. Who shall say, that some of their number may not, at no distant day, attain to the fruition of such aspirations.

It does not appear that any of this tribe are paupers, and, considering the relation in which they stand to the community and the State, it did not appear to be necessary to prosecute those inquiries into their economical condition, which, under other circumstances might be required. Before my visit to them, I was informed that one of the elder members desired to see me for the purpose of presenting a claim for land now in the possession of others. While there, the subject was spoken of, but no intention was manifested to pursue the matter, and with the view of it, which had been presented to me, I

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did not think it proper to encourage such a movement. It is said that the land was sold by the Indian proprietors, and payment received for it, and the only ground of the present claim is, that the consent of the legislature to the sale, as was then required by law, was not obtained, and that, consequently, it was illegal and void. It is believed that the chances of sustaining a claim resting on such a basis, after the occupants have been for a century or more in quiet possession, would hardly be worth the money which must be spent in its prosecution.

THE DARTMOUTH INDIANS.

The Indians of the Dartmouth country belonged to the Wampanoag tribe and were sub-divided into Acushnets, Acoaxets, and Aponegansets, by which names the several localities of their residence are still known. Their descendants are still found in the same region, comprised in the ancient town of Dartmouth, which embraced the present towns of Dartmouth and Westport, and the city of New Bedford. Their present residence is divided between these places, the most numerous settlement of them being on the west side of Westport River. A number of the families have emigrated to western New York, California, &c., and others are temporarily absent from the State. The number of those resident here or who are supposed to be only temporarily absent, is one hundred and eleven, viz.:—

Families,		29
Males,	58	
Females,	53	
	—	111
Natives,		99
Foreigners and unknown,		12
Under 5 years of age,	10	
From 5 to 10 years of age,	7	
10 to 21 years of age,	25	
21 to 50 years of age,	44	
50 to 70 years of age,	19	
Over 70 years of age,	6	
	—	111

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Those over 70 are respectively, 73, 74, 75, 77, 80, and 84 years of age.

Having no common lands or common fund, these Indians have escaped the special paternal care and guardianship of the State, and, relying on their own exertions, and mingling more with the general community than those on the plantations, are above the average of the Indians in civilization, general intelligence, and the enjoyment of the comforts and privileges of social life, contrasting very favorably in this respect, with their near neighbors and brethren of the same original tribe, who have enjoyed the privilege of the State's guardianship, on the Indian Reservation at Fall River. So far as is known, they are entitled to, and are in possession of, the rights and privileges of citizenship, in the towns where they reside.

The celebrated Paul Cuffe, well known both in this country and Europe, for his efforts in behalf of African civilization and Christianization, some forty-five years since, was a native of this tribe, of mixed Indian, African, and white descent. He visited the western coast of Africa, once or twice, in a vessel of his own, fitted out, freighted, and commanded by himself, and manned entirely with colored men. On one of his voyages, he visited England, and was received with marked attention in that country, even in the saloons of the nobility, and of royalty itself. He was a man of great probity of character, and one of the few men of his race who have accumulated property, so as to place themselves in circumstances of pecuniary independence. Some of his descendants still reside in the vicinity of his former residence, but a larger number have emigrated to California.

It has already been stated that these Indians have no common lands. They lay claim, however, to tracts of considerable extent, situated in Dartmouth and Westport, of which their white neighbors are in possession, and, to which, they affirm that the Indian title was never extinguished. There was an examination of their claim, at the public hearing at New Bedford, the last sesssion of which was held on the thirty-first of August last, (1859,) a notice of which is the subject of a special report.

None of these Indians are permanent paupers. One of them, in consequence of natural imbecility of mind, has required and received some assistance. There was said to be a female

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residing in one of the families named Amelia Lewis, aged 24, who claimed to be a descendant of the Gay Head Tribe, who, in consequence of a cancer had been obliged to rely, to some extent on private charity. I made an effort to see her, to investigate the matter, but failed, in consequence of her absence from home. It appeared, however, from what I could ascertain, that her grandmother belonged to Gay Head, but the family have been so long away from that place, that her claim for support would not be acknowledged by that tribe, nor does it seem just that she should be thrown upon them. Should she become a public charge, it would seem that her support should necessarily devolve on the State.

The statistics of these Indians, (see tabular list in Appendix, A,) are not so full as I had intended, in consequence of failing to receive returns from town and city clerks, which I hoped to get. The deficiency, however, considering the relation in which they stand to the State, was not thought of sufficient consequence to incur the expense which would be necessary to remedy it.

MAMATTAKEESET INDIANS.

The Mamattakeeset Indians had their original location in the vicinity of the Mamattakeeset Ponds, in Pembroke. It appears by the Plymouth Records, that about the year 1675 a council of war ordered the removal of the Mamattakeeset tribe to Clark's Island. This movement contemplated their safety from the attacks of hostile tribes. The numbers of this tribe, so far as they have been ascertained, is twenty-five, viz.:—

Families,		5
Males,	13	
Females,	12	
	—	25
Under 5 years of age,	5	
From 5 to 10 years of age,	2	
10 to 21 years of age,	5	
21 to 50 years of age,	7	
50 to 70 years of age,	5	
Of 70 and over years of age,	1	
	—	25

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The person over 70 years of age is Jane Hyatt, single woman, aged 71.

There is reason to believe there are several other persons belonging to this tribe, but as they all enjoy the rights of citizenship, it was not deemed necessary to pursue the inquiry further. Of those whose names are returned, (see Appendix, A,) one only is a pauper, and he has been supported by the town for about ten years past. None of them hold any real estate or other taxable property.

TUMPUM TRIBE.

The "Tumpums" are supposed to have been a local tribe, or subdivision of a tribe, whose former residence was in Pembroke and vicinity. Traces of them have been found in other places where they have intermarried, and the name is still found in Marshpee. The number remaining, who are not included in other tribes is fifteen.

Families,		4
Males,	6	
Females,	9	
	—	15
Under 5 years of age,	3	
From 5 to 10 years of age,	3	
10 to 21 years of age,	2	
21 to 50 years of age,	5	
Over 70 years of age,	2	
	—	15

Those over 70 are Abigail Christopher, aged 75, and David Fuller, aged 71.

The members of this tribe appear to be capable, intelligent, and moral. One aged person has received some public assistance. They are understood to be in the enjoyment of their civil rights, as citizens of the State.

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DEEP BOTTOM INDIANS.

Some five or six miles westerly of Edgartown, the road leading from that place to West Tisbury, Chilmark, and Gay Head, crosses a deep valley, which, commencing in the central portion of the island, slopes gradually down southward to the sea. This valley is called "Deep Bottom." Near its southern extremity, a little way up the western acclivity, is a small settlement of Indians, called, from the name of the valley, the Deep Bottom Indians. Their whole number is thirteen, viz.:—

Families,		4
Males,	7	
Females,	6	
	—	13
Natives,		13
Under 5 years of age,	2	
From 5 to 10 years of age,	1	
10 to 21 years of age,	2	
21 to 50 years of age,	6	
50 to 70 years of age,	2	
	—	13

The ancestors of these Indians have occupied this locality from the first settlement of the island by the whites. I am unable to say precisely how much land is held by them. I was disappointed of the opportunity at which I expected to obtain the particulars, and my subsequent inquiries, relative thereto, were ineffectual, owing to the secluded situation of the parties. The larger portion of what they hold is a tract of sixty or seventy acres, which, for a long period, was in the possession of others, but was awarded to them in 1858, by a commission instituted by the State to investigate the matter. Pending the inquiry, the occupants of the land cut the wood off, and sold it. For the value of this wood, the Indians had a just claim, but, on recovering possession of the land, they compromised this claim for a trifling consideration. They now complain that they were grievously wronged by the compromise, and that they submitted to it, only in consequence of their pressing necessity for something, and the want of means for litigating their claim, so

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as to secure a just equivalent for the value of the wood. The land recovered is worthless for cultivation, and, being stripped of its wood, would sell for very little, and will yield no income till it shall be again grown over with wood, and this will require twenty years or more, before it will be of a size suitable to cut. Thus the award added nothing to their present means of support, except the pittance they were induced to accept, as an equivalent for the value of the wood. That pittance was soon exhausted, and one family, that of Isaac Easton, when I was there, was in very destitute and straitened circumstances. His wife, a woman near 70 years of age, had been confined to her bed, of a distressing malady, for many months, without any prospect of speedy relief, and without the means, except through the charity of others, of obtaining medical aid and articles necessary for a person in her condition. Their case will probably be brought before the legislature by a petition for relief.

The land held by them, aside from that already spoken of, is a small patch adjacent to each of their humble dwellings, and they have no other property. They lay claim to other land in their vicinity, and had intended to present it for investigation at the public hearing held on the island, but failed to do so in consequence of the absence from the island, of the person on whom they relied, till it was too late to give him time to make the necessary preparations, and of their pecuniary inability to employ any other person to do it. Of the validity of the claim, I have no personal means of judging, but intelligent persons, having some knowledge of the facts, expressed the opinion that it was well founded.

The Deep Bottom Indians have no organization of their own, religious or municipal; they have never been under guardianship, and are not considered as entitled to the rights of citizenship. They are generally intelligent, and sustain a fair moral character. The natural sterility of the soil they occupy, compels them to seek other means of subsistence and keeps them in indigent circumstances; yet none of them have been supported as paupers, and, with the exception of the family above named, it is not apprehended that they will, for the present, become a public charge.

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MIDDLEBOROUGH INDIANS.

The Middleborough Indians were formerly located in the vicinity of what is called "Betty's Neck," in the present town of Lakeville. The whole number, reported to me is ten, viz.:—

Families,		4
Males,	3	
Females,	7	
	—	10
From 10 to 21 years of age,	2	
21 to 50 years of age,	7	
50 to 70 years of age,	1	
	—	10

It is understood that none of these now reside in Lakeville or Middleborough. The three males are all seafaring men, and two or three of the other families reside in New Bedford. It is believed that they all are entitled to the privileges of citizenship. They have no distinct organization, and have no lands in possession, either in common or in severalty. They lay claim to a tract of land, in the neighborhood of their former location in Lakeville, and the matter was brought to my notice, by one of the claimants, at one of the public hearings in New Bedford, and would have claimed my further attention, but that I found a special commission had been instituted by the legislature, charged with the specific duty of investigating all Indian land claims within the county of Plymouth, and, on inquiry, I found that this subject was in the hands of that commission. Under these circumstances, it appeared to me, that my duty required me to suspend any action in the case, and await the report of the commissioners, whose special duty it was to act therein.

Nothing is known of the peculiar circumstances, character, or condition of these Indians, which should prevent their being placed, with the other unorganized Indians of the State, on the same footing, and, in all respects, in the same legal relation to the Commonwealth as all the other citizens thereof.

It is not known that there are any paupers among these Indians.

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MISCELLANEOUS INDIANS.

Beside the descendants of Indians who are classified, there are others whose classification may be doubtful, some of them having the blood of two or three tribes in them, and others, who possibly may have been descended from some tribe out of the State. I have put these in a separate list under the head of Miscellaneous Indians. The number of these, of whom I have returns is sixty-nine, viz.:—

Families,		18
Males,	34	
Females,	35	
	—	69
Under 5 years of age,	3	
From 5 to 10 years of age,	6	
10 to 21 years of age,	20	
21 to 50 years of age,	28	
50 to 70 years of age,	8	
Of 70 and over,	2	
Unknown,	2	
	—	69

These are divided, in the list, into five sections, those in each section being of one kindred. Some claim descent from the Natick Indians, some from the Punkapogs, and others from the Narragansetts, while others, still, confess ignorance of what tribe they are descended from. None of their claims, on investigation, appeared sufficiently conclusive to decide on their classification. None of them are known to possess any land, and none of them it is believed are paupers, with the exception of one aged man, who has received some assistance. So far as could be ascertained, they are all allowed the rights of citizenship. They are all in indigent circumstances, though most of them obtain a good living. In their moral and social condition there is nothing peculiar, to distinguish them from the mass of the community in their station in life, many of them being respectable and intelligent, and performing their social and relative duties faithfully.

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From the foregoing we find that the census of the several tribes and scattered families of Indians and the descendants of Indians in the State presents the following

AGGREGATE.

Whole number of persons,		1,610
Families,		376
Males,	775	
Females,	829	
Unknown,	6	
		1,610
Natives,	1,438	
Foreigners or unascertained,	172	
		1,610
Under 5 years of age,	188	
From 5 to 10 years of age,	165	
10 to 21 years of age,	379	
21 to 50 years of age,	636	
50 to 70 years of age,	174	
Of 70, and over,	55	
Unknown,	13	
		1,610

The aggregates of the Plantation Tribes are as follows, viz.:

Whole number of persons,		1,241
Families,		291
Males,	588	
Females,	650	
Unknown,	3	
		1,241
Natives,	1,126	
Foreigners,	115	
		1,241
Under 5 years of age,	147	
From 5 to 10 years of age,	123	
10 to 21 years of age,	277	
21 to 50 years of age,	494	
50 to 70 years of age,	136	
Of 70 and over,	143	
Age unknown,	11	
		1,241

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Having passed the several tribes, &c., in review, we come to the consideration of the question, for the solution of which the statistics and other information embodied in this Report were required to be collected, viz., whether the Indians of the Commonwealth "can, compatibly with their own good, and that of the other inhabitants of the State, be placed immediately and completely, or only gradually and partially, on the same legal footing as the other inhabitants of the Commonwealth." In this consideration, the subject very naturally and conveniently separates itself into three divisions, viz. :—

1. In reference to those Indians and descendants of Indians, who, with their ancestors, have never been under the special guardianship of the State, who have no reservations, and who are either scattered and mingled with the other population, or reside in neighborhoods, without any distinct organization.

2. Those tribes having reservations, on which most of them reside, with little or no intermixture of whites amongst them, and who are, or have been, under guardianship—including the Chappequiddic, Christiantown, Gay Head, Marshpee, and Herring Pond tribes.

3. The tribes which have reservations, or have had them, and are, or have been, under guardianship, but of which the smaller portion only, or none at all, of them now remain on the reservations. These include the Fall River, Punkapog, Natick, Dudley, and Hassanamisco tribes, and to these may be added those of the second division, who have left their reservations, and reside elsewhere.

The Commissioner, distrusting his own ability to judge correctly on a question so complex, and involving considerations so important, and perhaps vital to the interests of so many individuals, would have been better satisfied if his responsibility ended here, and if, having collected and arranged the facts, he was at liberty to submit them to the wisdom of the legislature, without expressing any opinion of his own. But as the law requires him to report for the consideration of the legislature, bills founded on these facts, "in view of consummating the present provisions for conferring civil and political rights on the Indians of the Commonwealth," a further duty rests upon him, which, after anxious and careful consideration, he proceeds to fulfil.

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Of the first class of Indians, above named, he has no hesitation in saying, that in its moral and social condition, it stands decidedly ahead of the other two; that, nowhere among them, did he find the improvidence, penury, ignorance, and personal degradation, which are found combined in individual cases, in nearly all the plantation tribes, while a very considerable portion of them, whether mechanics or others, in the towns, or laborers in the farming districts, live as comfortably as their neighbors, and their character and general intelligence would not be discreditable to them in any community. This class, generally, rests under no legal disabilities; but, being exempt by law from taxation, some have chosen to avail themselves of that exemption, and submit to consequent disfranchisement, while others, who would prefer to exercise the rights of citizens, have submitted to the deprivation thereof, under the supposition that the towns had the right, by omitting to tax them, to debar them from the exercise of those rights, and that for this exclusion they had no remedy. The undersigned can see no reason for the exemption, as applied to this class, and would, therefore, respectfully recommend that they be at once put on the same footing, in every respect, as the inhabitants of the State, who are not of Indian extraction.

The second class is the most interesting of the three, both on account of its greater numbers—comprising eight hundred and fifty persons, or more than one-half of the whole—and of the anomalies which their case presents. Here are five communities within the State, but not of it, subject to its laws, but having no part in their enactment; within the limits of local municipalities, yet not subject to their jurisdiction; and holding real estate in their own right, yet not suffered to dispose of it, except to each other. In the five, without any good reason for the difference, three measurably diverse legal conditions prevail. Chappequiddick and Christiantown tribes are under guardianship,* and no person belonging to either of them, however capable or shrewd he may be, can make any contract, either to buy or to sell, which shall be valid in law, without the written consent of the guardian; and, for sundry petty offences, the guardian is authorized to inflict punishment unusual and

* See Act of 1827.

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cruel, and such as is not permitted in any other case, nor to any other offender, under the laws of the State. The law provides a semi-municipal organization for these tribes, but the provision is held in abeyance, and the law, in that respect, is not carried into effect. In Marshpee, a municipal organization is established,* with authority to assess taxes, yet without any power to enforce their collection; with authority for the management of the public lands and fisheries, for the establishment and maintenance of schools and the support of the poor; in brief, with the powers of a town, but not entrusted with the charge of their own funds, which are held by a Treasurer, appointed by the Governor and Council. The people of Gay Head were authorized to accept the provisions of the Act of 1827, relating to Chappequiddick and Christiantown, and it was provided that, whenever they should do it, the Governor might authorize the Guardian of those tribes to act as the Guardian of Gay Head, also. But, never having chosen to avail themselves of this *privilege*, this tribe, whose territory is not included within the limits of any town or municipality of the Commonwealth, have no legal organization whatever. The management of their public lands and funds, the disbursement of money for the support of schools and the poor, and for other purposes, and all other acts of a public nature, which are necessary, are managed through the agency of voluntary association, without any legal authority derived from the State to enforce their doings, or to give them validity. The difficulties to be encountered and overcome, under such a system, may well be imagined, and the repugnance with which they contemplate the idea of a guardianship may be inferred, from their having so long submitted to these difficulties, rather than accept the provisions of the Act of 1827.

But, with all this diversity of systems, in the tribes, the primary relations of the inhabitants to the State, and the mutual obligations between them and the State, are the same in all, and, in coming to a correct solution of our question, a clear understanding of that relation is necessary. The commissioners under the act of 1848, present a view of the matter in their report, that appears to me to be so correct, that I feel justified

* See Acts of 1834, and 1853.

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in quoting freely from it. All these tribes had received more or less pecuniary aid from the State, which, though granted mostly for public purposes, is, after all, a contribution of so much toward their support. The commissioners, after showing that these contributions were comparatively small, proceed to say:—

But, be the cost of supporting them greater or less, we take the ground that the State *owes* it to them, not as a gratuity, but as a debt which cannot be, honorably, or even honestly, evaded. We have brought them into their present condition. The disabilities under which we have placed them, while they declare their unfitness to perform the duties, have produced and perpetuated their unfitness to bear the burdens of citizenship.

The history of all conquered and proscribed races and classes, illustrates the impossibility of elevating such races and classes, while under civil and political disabilities. It was among the principal objects of the colonization of this country, in the language of the charter of the colony of Massachusetts Bay, that "the good life and orderly conversation of the colonists may win and incite the natives of the country to the knowledge and obedience of the only true God and Saviour of mankind, and the Christian faith, which, in our royal intention and the adventurer's free profession, is the principal end of this plantation." But, until the conversion of the Indians was accomplished, they were treated as heathen, and, of course, unfit to be members of a Christian Commonwealth. The early colonial legislation in regard to the Indians was dictated by the spirit which excluded all, except members of the church, from any agency in political or civil affairs. The progress of civil and ecclesiastical liberality has released all except the Indian from these disabilities. The African, the Turk, the Japanese, may enjoy in Massachusetts, all the privileges of American citizenship. The Indian, alone, the descendant of monarchs, is a vassal in the land of his fathers. Even the Declaration of Independence, the Bill of Rights, our State Constitution, brought no deliverance from oppression, no recognition of unalienable rights, no constitutional guaranties to the poor Indian. The inconsistency of our past and present treatment of the Indians, with the whole spirit, and, indeed, with the letter of our constitution, is so well exhibited by Mr. Hallett, in his argument before referred to, that we make no apology for making the following extracts, as applicable to all the Indians of the State:—

"They must be either hereditary vassals, or servants, by right of conquest, or public enemies held as hostages and prisoners, or paupers, or persons individually, not collectively, incapacitated and *non compos mentis*, or citizens.

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"The constitution recognizes no distinction of color, and no civil inability in classes or communities. It declares government to be a 'social compact by which the whole people covenants with each citizen, and each citizen with the whole people, that all shall be governed by certain laws, for the common good.'

"In the second article of the first chapter, it leaves all the rights of citizenship to every male inhabitant, of twenty-one years and upwards possessing certain property qualifications, 'and to remove all doubt concerning the meaning of the word inhabitant in this constitution, every person shall be considered an inhabitant, in that town, district, or plantation, where he dwelleth or hath his home.'

"Inhabitant and citizen, therefore, are synonymous terms, with the sole exception of aliens, paupers, and persons under guardianship, that is, under guardianship by general laws, affecting all citizens who come under their provisions, and not by special laws, made for a whole community, without discrimination.

"2. The Marshpee Indians are not aliens. They are not a domestic nation, as the Cherokees are declared to be, by the Supreme Court of the United States. They have no rights secured by treaty, and no other rights than those of property and person, applying to them, as to all other citizens.

"3. They are not vassals, slaves, or servants. They were not conquered by our fathers, but were the friends of the whites, before the war of the Revolution, and, in that war, fought on our side, for which some of them now receive pensions.

"4. Are they paupers? They cannot come under this head, for they are all freeholders in common, and the law permitting them to take the poor debtor's oath, makes an express exception of their landed property.

"5. Are they incapacitated? Not naturally. They are not *non compos mentis*. How then are they incapacitated? To justify the placing of the property and person of the citizen under guardianship, he must, individually, be incapacitated. Every individual of the Marshpee tribe must then be proved to be incapacitated, to justify taking away his rights of person and property, and they must be placed under the general laws of guardianship. You cannot declare a whole community to be incapacitated from the exercise of individual rights. As it regards the Marshpee Indians as a community, it is false reasoning, to take it for granted, that they are incapable of self-government; because they never have had a fair opportunity of testing their capacity, and because, they are now as well informed and as temperate as many of the plantations were, when originally incorporated into towns. On what principle, then, is it, that there has always been a distinction between the laws made for governing the Indians, and those made for the whole people, when the

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constitution declares that 'all shall be governed by certain laws for the common good.'

"It began in the necessity of guarding against the hostility of the Indian tribes; but this necessity ceased to exist, (if it ever did exist in relation to the Marshpee tribe,) long before the Revolution. Now, by what process of reasoning can it be shown, that the Indian inhabitants of this Commonwealth, were not included in the first article of the Bill of Rights? viz: 'All men are born free and equal, and have certain natural, essential, and unalienable rights; among which may be reckoned the right of enjoying and defending their rights and liberties; that of acquiring, possessing, and protecting property; in fine, that of seeking and obtaining their safety and happiness.'"

We dwell upon this point, not to indulge in useless fault-finding or regrets over past legislation, but for the purpose of directing attention to these disabilities, as producing and perpetuating the degradation of the Indians, and so constituting a claim upon the State which has established, and which still sustains, the system. No man can say what would have been the present condition of the Indians, but for these disabilities. It will not do to say that the Indian is incapable of improvement. The experiment has never been fairly tried. Efforts have been made to Christianize and elevate them; and we are gravely told, that, because they have always failed, therefore, they always must fail; but it seems to have been forgotten, that the effect of these efforts has always been controlled by the crushing influence of civil and political disability, and, as a necessary result of these, of social proscription. It is, as Frederick Douglas says, in relation to the incapacity of the African race for improvement,—himself an eloquent refutation of the falsity of the affirmation: "Sixteen millions of Anglo-Saxons grind to the very dust, three millions of Africans. Take your heels off of our necks, and see if we do not rise." We have treated the Indians as wards, serfs, vassals, slaves. We have taken the management of their property, and have allowed it to be squandered and lost. We claim the right to dispose of their persons, giving their guardians the power to bind them out, as minors, and to appropriate the proceeds of their labor, at their almost irresponsible discretion. That this power has not been abused is owing to the character of the guardians, and to a state of public opinion, which, unfortunately, has not yet infused itself into the laws. Can we hesitate as to the duty of the Commonwealth, to those whom Chief Justice Parker terms "the unfortunate children of the public."

We need not argue the question of the legal obligation of the Commonwealth to provide for the Indians. In the case of Andover *vs.* Canton, (Mass. Reports, vol. xiii., p. 547,) that matter was adjudicated upon and settled by the supreme tribunal of the State. The following

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extracts, from the decision of Chief Justice Parker, are pertinent and important, alike from the legal principles settled and the humane spirit which characterizes them. "It is not an admissible idea, that a tribe of Indians, of whom the legislature had assumed the guardianship, whose land and other property is taken into public custody, and even whose labor is disposed of, without consulting the inhabitants of the town within which they may dwell, should become chargeable to the town, in case of poverty, merely because they lived within its limits. There is always supposed to be a *consideration*, past or present, for the obligation of towns to rest upon, in the support of paupers. They have received some benefit from their property, or that of their ancestors, by taxation or otherwise; and they may dispose of them in service. But, with respect to this tribe of Indians, the town of Canton could never have received a benefit in any way, having no right to tax their property or their polls, or to diminish the expense of supporting them, by placing them out at service.

"Probably the legislature will consider the remaining tribes and parts of tribes of aboriginals, which yet remain within the confines of this Commonwealth, as the unfortunate children of the public, entitled to protection and support, when their means of subsistence fail, and when it shall be found that they are incapable of civilization, so far as to be admitted as citizens.

"Such seem to have been the humane views of the successive legislatures of the Colony, Province, and Commonwealth; they having, at various times, empowered agents to take care of the lands which were allowed to be the property of native Indians; and in several instances having provided means for their support, comfort, and instruction. It certainly would be more worthy of the liberal character of this Commonwealth, to make a general and permanent provision for the maintenance of such of the tribes, as shall be brought to indigence, than to throw the unequal burden upon the towns where they may have chiefly resided; those towns not only never having derived any benefit from their labor or property; but, on the contrary, having generally suffered disadvantage from having considerable landed property exempted from taxation, and from the unsettled habits and manners of such a population."

It seems to us, therefore, that from every consideration arising from our past treatment of the Indians, from a uniform recognition of the obligation by the legislature, and from the simplest requirements of humanity and justice, we owe to them a comfortable provision and support; not, indeed, such support as will perpetuate habits of indolence and improvidence, but such treatment as, while it shall relieve from present suffering, shall tend to form habits of self-reliance and self-support.

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They should not be treated as paupers. We find that they nearly all have that feeling of pride, which shrinks from being objects of charity. This feeling, which is almost the only vestige, and which a wise legislation should foster as the germ, of a hopeful self-respect, we should not wantonly wound. They are not State paupers. The legislation of the last one hundred and eighty years has recognized as Indians, all descendants of Indians residing upon Indian lands. We plead for them, not as paupers, or as public beneficiaries, but as entitled to the pittance which is necessary to their comfort; and, instead of compelling them to apply for scanty relief, year after year, to the committee on claims, which is generally composed of new men, who cannot become acquainted with the subject, who are usually too much influenced by the fear of being regarded as more extravagant than their predecessors, and who, as the history of the past shows, and from the nature of the case, are liable both to withhold and to grant unwisely, we think, to re-quote the words of Chief Justice Parker, "it would be more worthy of the liberal character of this Commonwealth, to *make a general and permanent provision* for the maintenance of these unfortunate children of the public."

It is the pride and glory of Massachusetts, that all the "unfortunate children of the public" within her borders are suitably cared for. The lunatic, the deaf mute, the blind, and even the poor idiot, partake of her bounty, bestowed not stintedly and grudgingly, but with that liberality of her great heart, which blesses, at once, the giver and the receiver. The Indians stand in this relation to her by a double tie, that of nature and adoption—an adoption, which, however well meant it may have been, has not been, thus far, prolific of blessings to them, for, in attempting to take care of their property, it has withheld from them the opportunity of learning to take care of it themselves, and, in depriving them of the right of citizenship, on the pretence that they were not qualified to exercise it, it has deprived them of the means of preparing themselves for the discharge of its duties, and of the incentives which would influence them to do it. Shall they, then, be an exception to the beneficent rule which has governed our action toward other classes. Or, shall not the State, rather, discharge to their full extent all the obligations, which these peculiar circumstances impose upon her? We have discharged but a small part of them, when we have appropriated a little money to repair a meeting-house or a school-house, for the

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support of such State paupers as accident may have thrown among them, or even when we may have provided for any trifling balance which may remain uncancelled in their annual expenditures. They will not be fulfilled, till we see that they are qualified, so far as their respective mental endowments will permit, to provide fully for their own wants, that they are prepared for the enjoyment of the rights and privileges, which, by nature and our social and political systems, are their due, and that they are secured in the possession of them.

The disabilities under which they labor can be remedied, only in part, by legislative action. The bitter prejudice of color and caste, and social exclusion can be remedied only by a more liberal, just, humane, and Christian public sentiment, and a satisfactory change in this respect must necessarily be a work of time. But civil and legal disabilities may be removed at any time, and the questions at issue are, as to the time when, and the manner in which it shall be done. That the Indians have an absolute *right* under our constitution to be citizens, few, probably, would deny. But, as the skilful physician, when, in consequence of weakness or disease, the light has been excluded from that delicate organ, the eye, does not let it suddenly in upon it, but only as it becomes strong and able to bear it, so should we treat the mental and moral weakness which our wrong has induced. We have despoiled them of most of their lands, and then, assuming that they are incapable of taking care of the rest, we have deprived them of their civil and legal rights, and, as a consequence, placed them under a social ban, wounding their self-respect, and taking away the incentives to improvement and progress, and have thus aggravated and perpetuated the very evil which we made the apology for the wrong. They have so long labored under these disabilities, and so long been subject to the encroachments, exactions, and sharp dealings, of the shrewder and more practiced men by whom they are surrounded, that they have come to look upon the laws which place them in this position, as their only safeguard from entire ruin. There is no doubt that if those on the larger plantations, included in this class, were placed at once on the same legal footing as the other inhabitants of the Commonwealth, they would become a prey to the unprincipled and unscrupulous; the patrimony of many, if not the most of

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them would soon be gone, and they would be left without the energy, skill, and self-reliance, necessary to acquire a living—a tax and a burden on the public. So well satisfied of this are the more intelligent among them, that I hardly found a man of this class, that did not deprecate the idea of such a change at the present time. At Marshpee, after a full discussion, the vote was unanimous against a change. At Gay Head and Chappeqiddick a similar feeling prevailed. There are individuals, who feel deeply the deprivation of their rights, and who have no fears on their own account, of the responsibilities which their restoration would impose on them; but, with a laudable abnegation of self, they seek rather the welfare of their race than the gratification of their own aspirations. There are a few, who are urgent for an immediate removal of their legal disabilities, but they are generally the intemperate and dissipated, or the idle and unprincipled, who seek a freer scope for the gratification of their appetites, or a better opportunity of preying on the substance of others.

In view of all the facts in the case, carefully ascertained, and of the deductions, which, on mature consideration, seem necessarily to flow from them, I have come to the decided conviction that the tribes, which are arranged in this class, can not, "compatibly with their own good, and that of the other inhabitants of the State, be placed immediately and completely on the same footing as the other inhabitants of the Commonwealth."

It is equally apparent, that it is not compatible with their own good or that of the other inhabitants of the State, that their present condition should be perpetuated, and it would afford special satisfaction, if we were prepared now to prescribe the limits of its duration. Whether it shall be shorter or longer, must depend in a great measure on the influences, which, by legislation or otherwise, shall be brought to bear upon them. They need education—not school learning merely, though that is necessarily comprehended in the term,—but the education of the whole man, and a better development of his powers, and a better appreciation of his possibilities and his responsibilities, than now prevails among them. They should be led to aspire for a better condition, and be trained to habits of

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patient, persevering, earnest, hopeful, and systematic industry as the means of attaining it.*

Of the existing agencies, which might be, and which ought to be, rendered more efficient to this end, the school teacher and the pastor are most prominent and available. The teacher should be fully impressed with the conviction that the book-knowledge which he imparts is not the end sought, but only a means to a higher and nobler end, and that it is often in his power to contribute to that end, more efficiently and successfully, than by the mere ordinary routine of school instruction. It is eminently in his power,—and what can be more legitimately in his province ?—by the influence which an earnest and qualified teacher acquires over his pupils, to mould their minds, and give them a direction which will influence, and possibly control, their whole subsequent life; and he should let no opportunity pass unimproved, to elevate their tone of thought and feeling, and to instil into their minds those lessons of practical wisdom and virtue, which give a zest to their studies, and add so much to the value of their learning, when acquired.

The influence of the pastor may be made more immediately perceptible in its practical results than that of the school teacher. Bearing in mind that Christianity is not the religion of barbarism but of civilization, and, in its better manifestations, of culture, and of refinement; that it purposes, not merely to save the soul, but to make it worth saving; that, in proportion as the mind is so cultivated, improved, and enlarged, as to enable it to comprehend and appreciate the beauty, simplicity, and sublimity of the great truths of religion, are the probabilities increased of its being brought under their influence; that we best perform our duty to our Maker when we make it include all our social and relative duties; a faithful pastor, among this people, will find that he has more duties than those of the Sabbath, to perform, and that, during the week, his time may be as profitably employed, in preparing those under his charge to become *good* Christians, as it can be, on that day, in

* Nothing strikes the visitor for the first time, to some of the plantations, more forcibly than this want of habits of systematic, well-directed industry. The use of spirituous liquors has unquestionably had much to do, in inducing the evil, but even this may be met and overcome by proper counteracting influences.

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the somewhat doubtful attempt, of persuading them to be, what only they can be, in their present condition, very indifferent ones. He will find, in fact, that both times have their appropriate and correlative duties, each auxiliary to the other, and each necessary to the success of both.

Combined with these influences, properly applied, if the legislature will provide for a single Commissioner for all the tribes, who will devote his whole time and energies to the improvement and amelioration of their condition, it will have made an important advance forward in the right direction, and prepared the way, it may be hoped, for an early consummation of the proposed change. Of this latter proposition there will be occasion to speak more fully, after we have treated of the tribes in the third class. With the exception of the substitution of the single Commissioner for the present Treasurer of Marshpee and Herring Pond tribes, and the Guardian of the Chappequiddick and Christiantown tribes, and giving him advisory powers in the Gay Head tribe, no farther change would be recommended in their political relations to the State, till the experience of the Commissioner shall demonstrate its necessity and indicate what it should be.

The moral and social condition of the tribes embraced in the *third division*, varies so much as to make the disposition which shall be made of them a more complex question. The Hassanamisco and the Natick tribes, and a portion of each of the others, including also the off-shoots from the tribes of the second division, who have abandoned their plantations and settled elsewhere, stand as well as those of the first division, and should, of course, follow the same destination. Those of the Fall River and Dudley tribes, who reside on the reservations, fall below the average of the second division in their general character, leaving the remainder of this division in an intermediate grade. No reason is perceived, sufficiently imperative, to prevent the placing of all in this division, with the exception of those residing on the plantations of the Fall River and the Dudley tribes and those who are beneficiaries of the State, at once, upon the same legal footing as the other inhabitants of the State. They have been, for some time, commingled with them in the same community, generally under as favorable circumstances, in most respects, as the other colored population of the State, to which

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they assimilate, and have not been subjected to the peculiar present disadvantages under which those labor who are residents of the plantations.

The plantations of the Fall River and Dudley tribes seem to have become little better than eleemosynary establishments, where pauperism is perpetuated from generation to generation. Still, if a Commissioner, having oversight of the Indians of the whole State, should be appointed, it would probably be the wisest course to delay any essential changes in relation to them, till he shall have had the opportunity to acquaint himself with their circumstances and condition, to consult with the present guardians, and then to consider what further action may be required. If such an officer should not be appointed, I would recommend that the guardianship be abolished, and that these two plantations be turned over to the charge of the overseers of the poor of Fall River and Webster, respectively, with such powers, limitations, and restrictions, as the legislature may see fit to impose.

In brief, it is recommended:—

I. That no change be made in the legal relation to the State, of those *residing on the plantations* of the Chappequiddick, Christiantown, Gay Head, Marshpee, Herring Pond, Fall River, and Dudley tribes, and those who may be only temporarily absent therefrom, and that all the other Indians of the State, except such as are now its beneficiaries, be placed at once on the same legal footing, as the other inhabitants of the Commonwealth; and that none may have reason to complain of unjust and illegal deprivation of their constitutional rights, it is recommended that any member of the above named tribes, who wishes to become a citizen, may do so by filing a certificate to that effect with the clerk of the town where he resides and paying a poll tax; whereupon he shall be entitled to all the rights and privileges of citizenship, and shall, thenceforward, be debarred from ever again returning to the legal condition of an Indian.

II. That a Commissioner be appointed, who shall perform all the duties now required of the treasurer of Marshpee and the guardians of the other tribes, who shall have advisory powers in relation to the Gay Head tribe, and whose duty it shall be, to watch over the interests of the Indians of the State,

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to guard and protect their rights, and to promote their general welfare and improvement.

It is believed that the same amount of good can be realized in no other way, at so little cost, as by the appointment of such a commissioner. He should have the whole subject of Indian affairs and relations under his charge, and should reduce it to a well-digested system, adjusted to the circumstances of the present time and the wants of the future. There has been neither order, system, nor uniformity of purpose, in our legislation concerning the Indians. The subject has not been studied, nor the facts ascertained, or the relations correctly understood, by successive legislatures, and consequently much of the legislation has been special in its character, and too often dictated by mere expediency for the occasion, to get over a present difficulty. Thus, grants of money have been unwisely made and indiscreetly applied, and the whole matter has become so complicated, that he must be a patient man who will trace out the legislation and digest it, and a wise one, if he can tell, when he has done it, precisely what the legal relations of the Indians are, and what their various rights, in relation to property, whether held in severalty or in common, having reference as well to the Indian traditional law as to the statutes of the Commonwealth. The commissioners under the law of 1848 encountered this difficulty. They say:—

"The legislation has been exceedingly loose and variant; sometimes it has been in the form of a general law, sometimes, of a special law, sometimes, of a resolve; and, of the latter, sometimes an annuity has been settled on a particular individual, and, at another time, an appropriation has been made to a guardian or judge of probate, for the benefit an individual or a tribe. *We have found it a most perplexing task* to go over the legislation of the last two hundred years, together with the records of executive proceedings, in order to ascertain the legal condition of each tribe; and we do not wonder that successive committees on claims and accounts, amid the pressure of other legislative duties, have abandoned the task of inquiry as to the laws now in force, in despair, and *have been compelled to resort to a temporary expedient, which has only made the confusion worse confounded.*"—(House Doc. No. 46, 1849, page 55.)

With one year's experience in the discharge of his official duties, the commissioner would probably be prepared to report to the legislature, as a substitute for existing laws, some general

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plan in relation to Indian affairs, by which order and system should be brought out of the present confusion. All expenditures of moneys appropriated by the legislature for the benefit of the Indians, should be made by him, as well to secure its economical use, as its faithful application to the purposes intended. All claims upon the State, for services rendered to the Indians or for articles furnished to them or for their benefit, and all petitions in which the rights, interests, or welfare of the Indians are specially involved, should come before him, to be reported on to the legislature. This would save that body from the danger of being misled and imposed upon, as it has been sometimes heretofore, by being obliged for want of some such source of information to rely on the *ex-parte* testimony of interested or incompetent witnesses.

But the great object sought to be secured by this appointment, would be, the institution of measures which should result, at no distant day, in such an improvement in the character and capabilities of the race, that they may safely be left to manage their own concerns and to rely on their own resources, without any supervision or aid, on the part of the State, more than it exercises in the affairs of every other individual. In this direction, if properly qualified for his place, he might accomplish much, by aid and counsel, in the developing and husbanding of their resources, and the judicious application of them, in the systematizing of their industry and giving it a profitable direction, in teaching them the value of their time, and such an appropriation of their leisure as shall make it a season of improvement or profit, instead of wasting it in idleness, or in hurtful or criminal indulgences—in fine, in the thousand ways in which a superior, cultivated, and practical mind may be useful among such a people.

But, as a guaranty of success, he must be fitted for the place. He must be prudent, judicious, discriminating, and impartial, with a greatly human heart, and must engage in his work in the true missionary spirit, more for the love of it, and for the good he may do, than for the pecuniary recompense he is to receive. He must win the confidence of the Indians, and having established that, he may exert an almost unlimited influence over them. This has been exemplified in the person of Hon. Leavitt Thaxter of Edgartown, who for a long period

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of time, has been the umpire of the members of the Vineyard tribes, in the settlement of nearly all cases of differences between them, and it is not known, that, in any instance, there has been an appeal from his judgment.

The appointment of such a commissioner was urgently recommended by the commissioners under the Resolve of 1848, as will be seen by reference to their report. They say:—

"We regard the appointment of a single commissioner, instead of the several guardians and the commissioner of Marshpee, as *indispensable* to the improvement of the Indians. They have been so long under disabilities, as to be, as a whole, incapable at present, of self-government; still, there is enough of Indian impatience of restraint, to make them dislike the idea of guardianship. They need counsel, advice, encouragement; almost universally they are teachable and accessible to kind influences. A single commissioner, intelligent, sagacious, and prudent, acting upon system, and devising means of *permanent* improvement, entrusted with discretion to apply the funds appropriated by the State for their benefit, *would contribute, more than any other instrumentality* we can conceive, to their permanent welfare and to prepare them for the privileges of citizenship."—(House Doc. No. 46, page 57, 1849.)

If the legislature believe that such an appointment would be advantageous to the Indians, the expense should not deter them from authorizing it. If it were only in consideration of the benefit accruing to them, it should be done, on the same principle that appropriations are made for other benevolent purposes, having this advantage over most of them, that it promises in the long run, to be pecuniarily remunerative. But considered simply in its economical aspect, it commends itself to our judgment. In the first place, it will save the salaries of the treasurer of Marshpee, and of the guardians of the other tribes. It would probably save its cost, in a short time, in the diminished amounts annually required for the aid and relief of the Indians, and the commissioners' report in 1849, before quoted, says: "The advantages arising from the familiarity of the commissioner with the facts necessary to be known to the committees of the legislature, would alone equal the amount of his salary." But, in this point of view, the important consideration is, that it would be likely, at a period not very remote,

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to enable us to dispense entirely with any appropriations in behalf of the Indians.

Viewing the whole subject in the light of all the facts and experience that can be brought to bear on it, there seem to be three prominent modes of disposing of it, each susceptible, however, of modifications which would not essentially change their character, from which we have to choose.

I. To leave things as they now are, with the certainty of the necessity of continued annual appropriations, and annual legislation, for an indefinite period of time, to meet the exigencies, which, to a considerable extent are constantly occurring.

II. To place the Indians at once on the same legal footing as the other inhabitants, with an equal certainty that appropriations, at least as large as heretofore, will be necessary for some years to come, and the strong presumption that they must be largely increased in the future, to meet the prospective pauperism which the change will induce: Or,

III. To adopt the proposed plan of a single commissioner, with the powers and duties already indicated, in the reasonable hope that, while it will conduce largely to the welfare of the Indians, it will not, for the present, essentially, if at all, increase the expenditure required under the existing system, and that it will be the means of saving it all, or nearly all, at no distant time in the future.

The economical view, though obviously the least important, has been most dwelt upon, for the reason that, practically, such considerations, more than any other, have influence in determining questions of this sort. Viewed in reference to other considerations, the reasons in favor of the change acquire an immensely increased force. In the decision of the question is involved the welfare of nearly a thousand of the unfortunate children of the State, and their posterity—unfortunate, because, for no fault of theirs, they have been despoiled of their property, robbed of their civil rights, shorn of their manhood, and made the unoffending and unresisting victims of a most cruel social proscription. It is proposed that we should, now, by such means as can safely and prudently be applied, prepare to lift from their shoulders the heavy burden we have imposed on them, and aid them in ascending to the position they ought to

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occupy. Their hands are stretched out imploringly to us for relief, and all they ask, and more than all they ask, is justice, so long delayed,—simple, naked justice. Shall not Massachusetts, with her large means, with the most intelligent, free, and prosperous community on the face of the earth, accord so much to her sorrowing and long-suffering children? Justice, Humanity, and Religion, unite in pleading, trumpet-tongued, in their behalf, and consistency to our own professions, our honor, our love of the right and hatred of the wrong—our own interest even—all, demand that we should aid, so far as we can do it by legislation, in lifting them up and preparing them for the full enjoyment of their civil rights, and, when prepared, that we should secure them in the enjoyment of them; and that we should, as nearly as circumstances will permit, place them on a perfect equality in all respects with every other citizen. All this we should do for them, because it is their due, and with any thing short of it we should never rest satisfied.

In conclusion, I have prepared Bills embodying the recommendations herein contained, which are presented for the consideration of the legislature.

All which is respectfully submitted,

JOHN MILTON EARLE.

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Commonwealth of Massachusetts.

In the Year One Thousand Eight Hundred and Sixty-One.

AN ACT

Concerning the Indians of the Commonwealth.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows:—

SECT. 1. All Indians and descendants of Indians in this State are hereby placed on the same legal footing as the other inhabitants of the Commonwealth, excepting those who are supported, or have been, in in whole or in part, by the State, and excepting also, those residing on the Indian plantations of the Chappequiddick, Christiantown, Gay Head, Marshpee, Herring Pond, Fall River, and Dudley tribes, or those whose homes are thereon and are only temporarily absent.

SECT. 2. Any Indian or person of color, belonging to either of the tribes before mentioned, and residing

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within the limits of any town or city of this Commonwealth, to whom the right of citizenship is not extended by the first section of this act, but who wishes to exercise that privilege, may certify the same in writing to the clerk of the town or city where he resides, who shall make record of the same; and upon paying a poll tax, he shall become, to all intents and purposes, a citizen of the State, and shall not, thenceforward, return to the legal condition of an Indian. And settlement shall be acquired, by those who become citizens, under the provisions of this act, in the same manner they are acquired by other persons, under the General Statutes of the Commonwealth.

Sect. 3. It shall be the duty of the governor, by and with the advice and consent of the council, to appoint an able, discreet, and suitable person, to be Indian commissioner, who shall hold his office for the term of three years, unless sooner removed by the governor and council. And the governor and council shall fill all vacancies which shall happen in said office, by death, resignation, expiration of said term, or otherwise. It shall be the duty of said commissioner to exercise a careful supervision over the affairs of all the Indians of the Commonwealth, not endowed by the provisions of this act, with the rights of citizenship, and to aid them, by advice, counsel, and whatever other suitable means may be within his control, to promote their welfare, to improve their general condition, and to qualify themselves, judiciously, and with safety to themselves and others, to be placed, at as early a time as may be, on the same legal footing as the other inhabitants of the Commonwealth. He

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shall exercise all the powers, perform all the duties, and be subject to all the restrictions, responsibilities, and liabilities, which now by law appertain to the treasurer of Marshpee, and to the guardians of other tribes, except so far as they may be changed or varied by the provisions of this act; and he shall give bonds, to the satisfaction of the governor and council, for the faithful performance of such trust.

Sect. 4. The said commissioner shall, as soon as is convenient, after his appointment, cause a registration to be made, on the basis of the general registration of the State, of all the members of the several tribes, specifying the parentage and date of the birth of each, as near as can be ascertained, and the date of all marriages of parties now living, with all the particulars, that are now required of town clerks, by the laws of the State, and having completed the same, up to the time required by law for the last preceding return to be made, he shall, thenceforward, make and keep a true registration of all the births, marriages, and deaths, in each of said tribes, and shall annually make due return thereof, the whole to be done in the same manner as is required of town clerks, and under the same liabilities and conditions that are, by law, imposed upon them.

Sect. 5. The said commissioner shall, in concurrence with the proper officers of the Gay Head tribe, cause a survey of all the land held in severalty, by the members of said tribe, setting out the same to each, by metes and bounds, and, when the survey is complete, shall cause a record of the portion of each

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proprietor to be made in the registry of deeds, of the county of Dukes County, and thereupon, the legal title shall vest in the several proprietors thereof, their heirs and assigns, forever: *provided, however*, that no land on the plantation shall ever be alienated from the tribe or be held or possessed by any person who is not a member thereof; and whenever the family of any proprietor becomes extinct, the real estate of said proprietor shall revert to said tribe and become the property thereof, in common. And whenever, hereafter, any common land shall be taken up to be occupied and possessed in severalty, by any member of the tribe, having the concurrence of the tribe therein, the same shall be surveyed, set forth, and recorded, under the supervision of said commissioner, as is above provided; and no title to any common land, to be held in severalty, on said plantation shall be acquired in any other manner.

SECT. 6. The said commissioner shall cause a survey to be made of the Indian plantation at Fall River and the bounds thereof to be renewed, agreeably to the survey made by order of the State in one thousand seven hundred and sixty-three. He shall ascertain to whom the several lots belong by hereditary descent from the proprietors to whom they belonged in one thousand seven hundred and sixty-four, so far as descendants of said proprietors still remain, and shall designate the same by the numbers of the lots respectively; and in the same manner, he shall designate the several lots, if such there be, of which the families of the former proprietors have become extinct, and shall make return of the same to the governor and council, for

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the use of the legislature, and shall report such other facts connected therewith as may be useful to them, and shall recommend such disposition of the land remaining in common, as in his judgment, shall be most conducive to the welfare of the Indians, and of the State.

SECT. 7. The said commissioner shall, as soon as the performance of the duties of his office shall have made him sufficiently acquainted with the necessities and wants of the Indians, and with the other facts necessary to qualify him for the service, prepare a bill embodying a system for governing, managing, and regulating the affairs of the several tribes, as nearly uniform in its provisions respecting them severally, as the circumstances of the different tribes will permit, as a substitute for the present laws on that subject, and report the same to the governor and council for the consideration of the legislature, accompanied by the reasons on which the several provisions therein recommended are sustained.

SECT. 8. The Indians and people of color on Gay Head, and the officers by them appointed for the purpose, shall have the same powers in the management of their municipal affairs, and in relation to the employment of teachers, and the making and enforcing of all rules for the regulation and government of their schools, that by law are exercised by the inhabitants and corresponding officers of the several towns of the Commonwealth: *provided, however*, that this shall not be construed to authorize the alienation of any of the territory of the plantation: and *provided, further*, that no person shall be authorized to vote in municipal

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affairs, except natives of the Gay Head tribe, natives of other Indian tribes of this State married or having been married to a Gay Head woman and resident on the plantation, or such other person resident on the plantation and married or having been married to a Gay Head woman, as shall have the right conferred on him by a vote of two-thirds of the voters of the plantation.

SECT. 9. All acts and parts of acts heretofore passed, so far as they conflict with the provisions of this act, are hereby repealed.

SECT. 10. This act shall take effect from and after its passage.

If the legislature should decide not to authorize the appointment of a single commissioner for the State, I would propose the passage of the same Bill with the following amendments:—

1. Strike out the whole of section 3.

2. Strike out in section 4 the words "said commissioner shall, as soon as is convenient after his appointment," and insert the words—clerk of Marshpee, the guardians of the several plantation tribes, and the clerk of Gay head shall.

3. In section 5, strike out the words "said commissioner," and insert the words—guardian of the Chappequiddick and Christiantown tribes. Also, in the latter portion of the same section, strike out the word "commissioner" and insert the word—guardian.

4. In section 6, strike out the words "said commissioner," and insert the words—guardian of the Troy or Fall River tribe.

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5. Strike out section 7, entire.

6. Alter the numbering of the sections after 2, to correspond to the changes.

7. Insert the following section after section 8:—

SECT. —. No person shall be entitled to support by any tribe in the State, of whose parents, one only was an Indian, and whose residence was not on the plantation of the tribe at the time of his birth, unless the rights of himself or parents as members of the tribe, shall have been subsequently recognized by the tribe.

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Commonwealth of Massachusetts.

In the Year One Thousand Eight Hundred and Sixty-One.

RESOLVE

In favor of the Marshpee Schools.

Resolved, That the sum of seventy-five dollars a year be allowed and paid over from the school fund, for the term of ten years, commencing with the present year, to the treasurer of Marshpee for the support of the schools in that District, the same being in addition to the sums now allowed for the support of said schools, and on the condition that the inhabitants of that District shall also appropriate and expend for the use of said schools, twenty-five dollars, per annum, in addition to the sum now annually paid by them for that purpose.

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Commonwealth of Massachusetts.

In the Year One Thousand Eight Hundred and Sixty-One.

RESOLVES

In favor of the Gay Head School.

Resolved, That the sum of fifty dollars a year be allowed and paid over from the school fund of this Commonwealth, for the term of ten years, commencing with the present year, to the guardian of the Chappequiddick and Christiantown Indians, for the purchase of the necessary books and apparatus for the use of the school of the Indians and people of color on Gay Head; and whenever, in any year, the whole of said sum shall not be required for that purpose, the balance thereof shall be applied to the support of said school, in connection with the money which it is otherwise entitled to draw from the school fund of the State.

Resolved, That the sum of sixty dollars a year be allowed and paid out of the school fund of the Commonwealth, for the term of ten years, commencing with the present year, to the guardian of the Chappequiddick and Christiantown Indians, to be applied toward the support of the school of the Indians and people of color on Gay Head.

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Commonwealth of Massachusetts.

In the Year One Thousand Eight Hundred and Sixty-One.

RESOLVE

In favor of Patty Pease, alias Jepherson, and Patience Blodgett.

Resolved, That the guardian of the Natick Indians be directed to divide the fund of said tribe into two equal parts, and pay over one moiety thereof to the selectmen of the town of Douglas, if they will accept the trust, to be put out at interest and well secured, for the benefit of Patty Pease, alias Jepherson, a member of said tribe, or invested in real estate for her use, as they may deem, on consultation with her, most conducive to the welfare of herself and family, and to pay over the other moiety thereof to the selectmen of Natick, they accepting the trust, to be held and applied in the same manner for the benefit of Patience Blodgett, of said tribe: *provided*, that if said sums are put out at interest, the interest only shall be paid over, annually, to said Patty and Patience, for their comfort and support, and if invested in real estate, the deeds shall be taken in trust for the use of them and their heirs, forever.

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APPENDIX.

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A.

CHAPPEQUIDDICK INDIANS.

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Isaiah Belain,	52	Married,	Chappequiddick,	Farmer,	Chappequiddick Plantat'n,	9 cattle, 1 swine,	35 acres.
Lawra Belain,	42	"	"	–	" "	–	–
Lucretia Belain,	27	Single,	"	–	" "	–	–
Harriet Ann Belain,	9	Girl,	"	–	" "	–	–
David Belain,	43	Married,	"	Farmer,	Chappequiddick,	3 cattle, 2 swine,	3 acres on plantation 7 outside.
Harriet R. Belain,	38	"	"	–	"	–	
Mary B. Belain,	11	Girl,	"	–	"	–	–
Timothy E. Belain,	8	Boy,	"	–	"	–	–
Matilda S. Belain,	6	Girl,	"	–	"	–	–
Abraham Brown,	67	Married,	Mixed, (for'ner,)*	Farmer,	Chappequiddick Plantat'n,	9 cattle, 3 swine,	35 acres.
Lucy Ann Brown,	59	"	Chappequiddick,	–	" "	–	–
Charles Brown,	43	Single,	"	Mariner,	" "	–	–
Trilona Brown,	31	"	"	–	" "	–	–
James W. Brown,	28	"	"	Mariner,	" "	–	–
Emily Brown,	24	"	"	–	" "	–	–
Edwin L. Brown,	20	"	"	–	" "	–	–
Lydia B. Brown,	14	"	"	–	" "	–	–
Alonzo Brown,	9	Boy,	"	–	" "	–	–
Thaddeus Cook,	34	Single,	"	Mariner,	" "	–	28 acres.
Frederick Cook,	27	"	"	"	" "	–	–
Mary Havens,	33	Widow,	"	–	" "	–	–
Simon Simpson,	35	Single,	"	"	" "	–	–

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James W. Curtis,	39	Married,	Colored, (for'ner)	Mariner,	Edgartown,	–	–
Frances E. Curtis,	32	"	Chappequiddick,	–	"	–	–
Love P. Curtis,	13	Girl,	"	–	"	–	–
Elizabeth C. Curtis,	11	"	"	–	"	–	–
Joseph Curdoody,†	35	Single,	–	–	Chappequiddick Plan't'n,	–	–
Francis Goodrich,	53	Married,	Chappequiddick,	Mariner,	" "	1 swine,	20 acres.
Theodate Goodrich,	45	"	"	–	" "	–	–
Sarah Louisa Goodrich,	15	Single,	"	–	" "	–	–
Samuel P. Goodrich,	12	Boy,	"	–	" "	–	–
Richard Gould,	39	Married,	"	Mariner,	New Bedford,	–	–
Sarah W. Gould,	42	"	Narragansett,	–	"	–	–
Richard Gould, Jr.,	10	Boy,	Chappequiddick,	–	"	–	–
Ferriby Harris,	78	Widow,	"	–	Chappequiddick Plan't'n,	–	11 acres.
John Ross,	Unk.	Married,	Colored, (for'ner)	Mariner and Farmer,	" "	1 swine,	–
Hannah Ross,	39	"	Chappequiddick,	–	" "	–	–
Charles F. Webquish,	12	Boy,	"	–	" "	–	–
Eleanor Joseph,	83	Widow,	"	–	" "	2 cattle, 1 swine,	18 acres.
Jared Summons,	40	Single,	"	–	" "	–	–
William Johnson,‡	76	Widower,	Colored, (for'ner)	State Pauper,	" "	–	12 acres.
Isaac Joab,	46	Married,	Deep Bottom,	Mariner,	Chappequiddick, (outside)	–	8 acres on plantation, 20 outside.
Ann Joab,	36	"	Chappequiddick,	–	" "	–	–
Jane Ann Joab,	12	Girl,	"	–	" "	–	–
Charlotte D. Joab,	–	"	"	–	" "	–	–
Isaac Joab, Jr.,	–	Boy,	"	–	" "	–	–

* The term "foreigner" is used, throughout, in the Indian sense, simply to designate one not of Indian descent.

† Absent for several years and is probably dead. December, 1860.

‡ Died July 8, 1860.

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CHAPPEQUIDDICK INDIANS—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Thomas Layton,	46	Married,	Chappequiddick,	Mariner,	Away, supposed dead.	–	–
Mary Layton,	37	"	"	–	Chappequiddick Plan't'n,	–	14¼ acres.
John D. Layton,	32	Single,	"	"	" "	–	–
Henry Jonas,	22	"	"	"	" "	–	–
William A. Martin,	30	Married,	Colored, (for'ner)	"	" "	–	–
Sarah G. Martin,	26	"	–	–	" "	–	–
William H. Matthews,	42	"	Colored, (for'ner)	Light Boat Keeper,	" "	4 cattle, 1 swine,	22 acres.
Margaret P. Matthews,	34	"	Chappequiddick,	–	" "	–	–
Prince William Matthews,	14	Boy,	"	–	" "	–	–
Eunice C. Matthews,	10	Girl,	"	–	" "	–	–
Oliver D. Matthews,	7	Boy,	"	–	" "	–	–
Isidora Matthews,	2	Girl,	"	–	" "	–	–
Love Prince,	56	Widow,	"	–	" "	–	40 acres.
Jane Sams,	63	"	"	–	" "	2 cattle, 1 swine,	18¾ acres.
Sophronia Sams,	30	Single,	"	–	" "	–	–
Mazilla Sams,	27	"	"	–	" "	–	–
Angeline Sams,	25	"	"	–	" "	–	–
Jane Ann Taylor,	20	"	"	–	" "	–	–
James Thomas Jackson,	11	Boy,	"	–	" "	–	–
Zadok Simpson,	59	Married,	"	Farmer,	Chappequiddick,	4 cattle, 1 swine,	30 acres.
Sarah R. Simpson,	56	"	Marshpee,	–	"	–	–
Ann Eliza Simpson,	27	Single,	Chappequiddick,	–	"	–	–
George Henry Simpson,	20	"	"	–	"	–	–

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Daniel T. Webquish,	37	Married,	Marshpee,	Farmer,	Chappequiddick,	4 cattle, 1 horse, 1 swine,	41 acres.
Anstis G. Webquish,	26	"	Chappequiddick,	–	"	–	–
John E. West,	37	"	Colored, (for'ner)	Barber,	New Bedford,	–	–
Betsy West,	38	"	Chappequiddick,	–	" "	–	–
John R. West,	2	Boy,	"	–	" "	–	–

CHRISTIANTOWN TRIBE.

Rachel B. Anthony,	15	Girl,	Christiantown,	–	Gay Head,	–	} 8 acres.
Joseph S. Anthony,	11	Boy,	"		"	–	
James W. DeGrasse,	41	Married,	"	Farmer,	Christiantown,	4	16 acres.
Lucinda C. DeGrasse,	40	"	"	–	"	–	–
Lydia L. DeGrasse,	19	Single,	"	–	"	–	–
James Henry DeGrasse,	7	Boy,	"	–	"	–	–
Elbina A. DeGrasse,	3	Girl,	"	–	"	–	–
George W. DeGrasse,	35	Married,	"	Mariner,	"	–	16 acres.
Betsy B. DeGrasse,*	35	"	Herring Pond,	–	"	–	47 acres.
Samuel W. Francis,	32	"	Fall River,	Farmer,	"	–	16 acres.
Caroline L. Francis,	39	–	Christiantown,	–	"	–	–
Hepzibah Goodrich,	42	Widow,	"	–	"	–	25 acres.
Ellen Goodrich,	19	Single,†	"	–	"	–	–
Anna Goodrich,	3	Girl,	"	–	"	–	–

* Land at Herring Pond.

† Since married to Robert Furman, colored, (foreigner,) aged 23, farmer, and has a son, born November, 1860.

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CHRISTIANTOWN TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Thomas James,*	83	Married,	Christiantown,	Farmer,	Christiantown,	7 cattle, 1 swine,	72 acres.
Judith James,	69	"	"	–	"	–	–
Francis Spencer,	23	Single,	"	Mariner,	"	–	–
Eunice Eliza Spencer,	16	"	"	–	"	–	–
William L. Grant,	19	"	"	–	"	–	–
William S. James,†	29	"	"	Mariner,	"	–	–
Charles W. James,	38	Married,	"	Farmer,	"	–	14 acres.
Mary Ann James,	34	"	Chappequiddick,	–	"	–	–
Ann A. James,	1	Girl,	Christiantown,	–	"	–	–
George E. James,	33	Married,	"	Farmer,	"	–	00 acres.
Jane Elizabeth James,	26	"	Gay Head,	–	"	–	–
Leavitt T. James,	7	Boy,	Christiantown,	–	"	–	–
Albertina K. James,	5	Girl,	"	–	"	–	–
Lavinia V. James,	3	"	"	–	"	–	–
William S. James,	1½	Boy,	"	–	"	–	–
Samuel Mingo,	68	Married,	"	Wheelwright & farmer,	"	1 horse, 1 cow, 1 swine,	52 acres.
Jane Mingo,	57	"	"	–	"	–	–
Sarah A. Mingo,‡	21	Single,	"	–	"	–	–
Joseph Q. Mingo,	33	Married,	"	Farmer,	"	3 cattle, 1 swine,	8 acres.
Lydia Mingo,	22	"	Gay Head,	–	"	–	–
Hepzibah Peters,	71	Widow,	Tisbury,	–	"	2 cattle, 2 swine,	18 acres.
Martha J. Spencer,	50	"	Christiantown,	–	"	–	–
Charlotte M. Belain,	45	"	"	–	"	–	–

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Asa Peters,	46	Married,	Christiantown,	Farmer,	Christiantown,	4 cattle, 2 swine,	22 acres.
Aurilla Peters,	38	"	Chappequiddick,	–	"	–	–
Leander Peters,	19	Single,	Christiantown,	–	"	–	–
Charles Peters,	14	Boy,	"	–	"	–	–
Sarah Peters,	11	Girl,	"	–	"	–	–
George Peters,	9	Boy,	"	–	"	–	–
Johnson Peters,	7	"	"	–	"	–	–
Samuel Peters,	4	"	"	–	"	–	–
Isidore Peters,	2	Girl,	"	–	"	–	–
William H. Saunders,	42	Married,	Deep Bottom,	Mariner,	Deep Bottom, Tisbury,	–	–
Almira Saunders,	33	"	Christiantown,	–	" "	–	–
Lovisa Simpson,	52	Widow,§	Chappequiddick,	–	Christiantown,	–	30 acres.
Hannah Simpson,[1]	20	Single,	Christiantown,	–	"	–	–
Adriana Simpson,[1]	19	"	"	–	"	–	–
John H. Spencer,	19	Married,	"	Mariner,	‖ "	–	–
Melissa Z. Spencer,	21	"	Marshpee,	–	"	–	–

* Since deceased, in January, 1860. † Since married to Avis A. Devine, of Gay Head. ‡ Since deceased.

§ Since married to a stranger named Carey, who, after a few days, deserted her, but subsequently returned, and is now, (December, 1860,) with her.

‖ J. H. Spencer is at sea, and his wife is with her father, S. Attaquin, at Marshpee, where it is expected they will settle on his return.

[1] Hannah and Adriana Simpson each has a daughter born in the autumn of 1860.

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GAY HEAD TRIBE.

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Mehitable Ames,	80	Widow,	Gay Head,	–	Gay Head,	–	3 acres.
John Anthony,	44	Married,	Portuguese (for.)	Mariner,	"	1 horse, 1 swine,	–
Mary C. Anthony,	45	"	Gay Head,	–	"	–	6 acres.
Rachel B. Anthony,	15	Single,	"	–	"	–	–
Joseph S. Anthony,	11	Boy,	"	–	"	–	–
Leander Bassett,	50	Married,	Edgartown,	Farmer,	"	5 cattle,	5 acres.
Huldah Bassett,	52	"	Gay Head,	–	"	–	–
Julia Bassett,	21	Single,	"	–	"	–	–
Moses Bassett,	15	Boy,	"	–	"	–	–
Esther Bassett,	12	Girl,	"	–	"	–	–
Bethiah Bassett,	11	"	–	–	"	–	–
George J. Belain,*	49	Married,	Chappequiddick,	Mariner and farmer,	"	7 cattle, 2 horses,	12 acres.
Sophia Belain,	43	"	Gay Head,	–	"	–	–
Betsy Belain,	16	Single,	"	–	"	–	–
Peter Belain,	12	Boy,	"	–	"	–	–
Joseph Belain,	11	"	"	–	"	–	–
Alonzo Belain,	9	"	"	–	"	–	–
Daniel Belain,	5	"	"	–	"	–	–
William Belain,	31	Married,	Chappequiddick,	Mariner,	"	–	–
Laura Ann Belain,	21	"	Gay Head,	–	"	–	–
Frederick Belain,	4 mos.	Boy,	"	–	"	–	–
Priscilla Bowes,†	26	Single,	"	–	"	–	–

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James Bowyer,	45	Married,	Colored, (for'er,)	Farmer,	Gay Head,	2 cattle,	4 acres.
Mehitable Bowyer,	48	"	Gay Head,	–	"	–	–
Alexander Brown,	86	Widower,	Colored, (for'er,)	Pauper,	"	–	–
Patience Cole,	77	Widow,	Gay Head,	–	"	–	–
Andrew John Cole,	16	Boy,	"	–	"	–	–
Tirzah R. Cole,	11	Girl,	"	–	"	–	–
Thaddeus W. Cook,‡	36	Married,	"	Mariner,	"	3 cattle, 2 swine,	8½ acres.
Emily G. Cook,	29	"	"	–	"	–	–
Christina Cook,	6	Girl,	"	–	"	–	–
Jothannes Salisbury,	33	Single,	"	Mariner,	"	–	3 acres.
Hannah Cooper,	68	Widow,	"	–	Chilmark,	–	10 acres.
George W. Cooper,	41	Married,	"	Mariner and Farmer,	Gay Head,	1 cow,	4 acres.
Sarah M. Cooper,	24	"	Marshpee,	–	"	–	–
Susan Cooper,	3	Girl,	Gay Head,	–	"	–	–
Aaron Cooper,§	39	Married,	"	Farmer,	"	5 cattle, 4 horses	12 acres.
Phebe Cooper,	27	"	Marshpee,	–	"	and 2 swine,	–
Georgiana Cooper,	10	Girl,	Gay Head,	–	"	–	–
Nancy A. Cooper,	8	"	"	–	"	–	–
Aaron Cooper, Jr.,	2	Boy,	"	–	"	–	–
Thomas Cooper,	50	Single,	"	Pauper, blind,	"	–	–
Abiah Cooper,	59	Widow,	"	–	"	1 cow,	2 acres.
Belinda Cooper,‖	20	Single,	"	–	"	–	–

* Another son, John W., born in October, 1859.

† Since married to John Williams, colored, (foreigner,) laborer of West Tisbury, aged about 40.

‡ Another daughter, Ida, born about March, 1860.

§ Another daughter, Alice, born about January, 1860.

‖ Andrew Cooper, son of Belinda, born February, 1860.

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GAY HEAD TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Zaccheus Cooper,	35	Married,	Gay Head,	Farmer,	Gay Head,	4 cattle, 1 horse,	10 acres.
Martha R. Cooper,	34	"	Marshpee,	–	"	and 1 swine,	–
Rhoda Frances Cooper,	9	Girl,	Gay Head,	–	"	–	–
Abraham F. Cooper,	7	Boy,	"	–	"	–	–
Susannah T. Cooper,	5	Girl,	"	–	"	–	–
Landon Corsa,	46	Married,	Colored, (for'er,)	–	Has run away,	–	–
Julia Corsa,	46	"	Gay Head,	–	Gay Head,	–	½ acre.
Abby A. Corsa,	18	Single,	"	–	"	–	–
Coombs Corsa,	15	Boy,	"	–	"	–	–
Levi Cuff,	40	Single,	"	Mariner,	"	1 cow,	2 acres.
Paul Cuff,	37	"	"	"	"	–	2 acres.
George David,*	51	Married,	"	Farmer,	"	5 cattle, 1 horse,	15 acres.
Louisa David,	47	"	"	–	"	and 3 swine,	–
Alexander David,	16	Boy,	"	–	"	–	–
Prudence David,	11	Girl,	"	–	"	–	–
Patrick Devine,	49	Married,	"	Farmer,	"	5 neat cattle, 1	9 acres.
Louisa Devine,	33	"	Marshpee,	–	"	horse & 1 swine,	–
Mercy A. Devine,	11	Girl,	Gay Head,	–	"	–	–
Hannah C. Devine,	9	"	"	–	"	–	–
Simon J. Devine,	2	Boy,	"	–	"	–	–
Grafton E. Devine,	2 mos.	"	"	–	"	–	–
Patrick L. Devine,	5	"	"	–	"	–	–

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Betsy Dodge,	70	Single,	Gay Head,	–	Gay Head,	–	2 acres.
Caroline Dodge,	65	"	"	–	"	–	
John Devine,*	46	Widower,	"	Farmer,	"	4 cattle, horse, &	15 acres.
John Devine, Jr.,	23	Single,	"	Mariner,	"	1 swine,	–
Avis A. Devine,†	19	"	"	–	"	–	–
Abiah T. Devine,	12	Girl,	"	–	"	–	–
Parnel B. Devine,	6	Boy,	"	–	"	–	–
James Diamond,	36	Married,	Indian, (foreign.)	Uncertain,	Gone to parts unknown.	–	–
Abiah Diamond,	38	"	Gay Head,	–	Gay Head,	–	4 acres.
Jane Cook,‡	19	Single,	"	–	"	–	–
Lewis Cook,‡	10	Boy,	"	–	"	–	–
William Harrison Cook,‡	7	"	"	–	"	–	–
Forstena Cook,‡	6	Girl,	"	–	"	–	–
Maria I. Cook,‡	4	"	"	–	"	–	–
Rachel Diamond,	1	"	"	–	"	–	–
Phillip Dodge,	45	Single,	"	Mariner,	"	–	–
Jonathan Francis,	61	Married,	"	Farmer,	"	2 pigs,	4 acres.
Mary Ann Francis,	56	"	Christianton,	–	"	–	–
Samuel Haskins,	28	Single,	Gay Head,	Mariner,	"	–	–
Zaccheus Howwoswee,	57	Married,	"	Farmer,	"	8 cattle, horse,	34 acres.
Elizabeth Howwoswee,	49	"	"	–	"	colt, and 2 swine,	–
Esther Howwoswee,	63	Single,	"	–	"	–	7 acres.

* Since deceased.

† Avis A. Devine is since married to William S. James, of Christiantown.

‡ Children of Abiah Diamond, by Lewis Cook her first husband.

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GAY HEAD TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
William Holmes,	19	Single,	Gay Head,	Servant,	New York,	–	–
Amos Jeffers,	75	Married,	Marshpee,	Farmer,	Gay Head,	1 cow, 1 horse,	–
Lydia Jeffers,	42	Single,	Gay Head,	–	"	–	½ acre.
William Jeffers,	51	Married,	Christiantown,	Mariner,	"	5 cattle,	4 acres.
Eliza C. Jeffers,	25	"	Gay Head,	–	"	–	–
Mary C. Jeffers,*	17	Single,	"	–	"	–	–
Hepzibah J. Jeffers,	10	Girl,	"	–	"	–	–
Lydia Johnson Jeffers,	7	"	"	–	"	–	–
Isaac Newton Jeffers,	2½	Boy,	"	–	"	–	–
James Jeffers,	25	Married,	"	Mariner,	"	–	–
Mellissa Jeffers,	23	"	"	–	"	–	–
Elzada Jeffers,	2	Girl,	"	–	"	–	–
Thomas Jeffers,	33	Married,	Gay Head,	Mariner,	Gay Head,	1 cow,	7 acres.
Lucina Jeffers,	24	"	"	–	"	–	–
Thomas C. Jeffers,	5	Boy,	"	–	"	–	–
Cordelia Jeffers,	3	Girl,	"	–	"	–	–
Amos Jeffers,	1½	Boy,	"	–	"	–	–
Josiah Jerard,	61	Married,	Sandwich, (for.)	Mariner,	Insane Hospital, Taunton,	–	–
Olive Jerard,	60	"	Gay Head,	–	Gay Head,	–	1 acre.
Josiah Jerard, Jr.,	16	Boy,	"	–	"	–	–
Jane Mingo,†	28	Single,	"	–	"	–	–
Charles Mingo,†	22	"	"	–	"	–	–

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Joel Jerard,	33	Married,	Gay Head,	Mariner,	Gay Head,	1 cow, 1 horse,	3 acres.
Rosannah Jerard,	20	"	"	–	"	–	–
Abraham Jerard,‡	35	Single,	"	Mariner,	"	–	–
Simon Johnson,	65	"	"	Farmer,	"	1 cow, 1 horse,	30 acres.
Simon Johnson, 2d,	33	"	"	Mariner,	"	–	10 acres.
Prince Johnson,	57	Married,	"	"	Chilmark,	–	–
Elizabeth Johnson,	48	"	"	–	"	–	–
Peter Johnson,	20	Single,	"	–	"	–	–
Jonathan F. Johnson,	19	"	"	–	"	–	–
Algernon S. Johnson,	18	Boy,	"	–	"	–	–
Sarah F. Johnson,	17	Girl,	"	–	"	–	–
Julia Johnson,	14	"	"	–	"	–	–
Methia H. Johnson,	11	"	"	–	"	–	–
William Prince Johnson,	8	Boy,	"	–	"	–	–
Diana Madison,	51	Widow,	"	–	Gay Head,	6 cattle, 1 swine,	16 acres.
Anna J. Madison,	23	Single,	"	–	"	–	–
Charlotte Madison,	19	"	"	–	"	–	–
Charles B. Madison,	17	Boy,	"	Mariner,	"	–	–
Isaac Madison,	14	"	"	–	"	–	–
Raymond Madison,	1	"	"	–	"	–	–
Thomas Manning,	45	Married,	"	Farmer,	"	3 cattle, 2 swine,	8 acres.
Rosabelle Manning,§	27	"	"	–	"	–	–
Isabella Manning,	3	Girl,	"	–	"	–	–
Thomas E. Manning,	1	Boy,	"	–	"	–	–

* A son born of Mary C. Jeffers, February, 1860.

‡ Abraham is Joel's brother.

† Jane and Charles Mingo are children of Olive Jerard, by her first husband.

§ Another daughter, Rebecca I. Manning, born in May, 1860.

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GAY HEAD TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Alvan Manning,*	43	Married,	Gay Head,	Farmer,	Gay Head,	2 swine,	12 acres.
Daniel Nevers,	43	Single,	"	Mariner,	"	–	3 acres.
Absalom Nevers,	36	Married,	"	"	"	–	–
Louisa Nevers,	31	"	"	–	"	–	–
Ann E. Nevers,	15	Single,	"	–	"	–	–
Alexander Nevers,	9	Boy,	"	–	"	–	–
Johnson Peters,	76	Married,	Chappequiddick,	Farmer,	"	7 cattle, 2 horses,	14 acres.
Mary Peters,	76	"	Gay Head,	–	"	2 swine,	–
Betsy Peters,	47	Single,	"	–	"	–	–
Mary Cuff,	15	"	"	–	"	–	–
Samuel Peters,	50	Married,	"	Farmer,	"	4 cattle, 1 horse,	8 acres.
Sarah A. Peters,†	49	"	"	–	"	1 swine,	–
Samuel Peters, Jr.,	19	Single,	"	–	"	–	–
Jesse P. Peters,	16	Boy,	"	–	"	–	–
Johnson Peters, 2d,	14	"	"	–	"	–	–
Joseph Peters,	8	"	"	–	"	–	–
Francis Peters,	7	"	"	–	"	–	–
John P. Randolph,	47	Married,	Haytian, (for.)	Laborer,	"	–	–
Serena C. Randolph,	39	"	Gay Head,	–	"	–	4 acres.
Margaret P. Randolph,	11	Girl,	"	–	"	–	–
Robert Morton,	13	Boy,	"	–	"	–	–

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Abraham Rodman,	51	Married,	Narragansett,	Carpenter,	Gay Head,	12 cattle, 1 horse,	25 acres.
Charlotte M. Rodman,‡	45	"	Gay Head,	–	"	4 swine,	–
Mary Jane Rodman,	18	Single,	"	–	"	–	2 acres.
Benjamin Rodman,	15	Boy,	"	–	"	–	–
Caleb Rodman,	13	"	"	–	"	–	–
Elizabeth Rodman,	9	Girl,	"	–	"	–	–
Isaac D. Rose,§	47	Married,	Fall River,	Farmer,	"	–	12 acres.
Harriet A. Rose,	38	"	Gay Head,	–	"	–	–
Alfred P. Rose,	11	Boy,	"	–	"	–	–
Mincolo C. B. Rose,	6	Girl,	"	–	"	–	–
Francis Sylvia,	51	Married,	Portuguese, (for.)	Mariner,	Gone to parts unknown,	–	–
Eleanor Sylvia,	40	"	Gay Head,	–	Gay Head,	–	16 acres.
James Sylvia,	12	Boy,	"	–	"	–	–
Eleanora P. Sylvia,	8	Girl,	"	–	"	–	–
Maria Sewell,	59	Single,	"	Pauper,	"	–	–
William Shepherd,	66	Married,	Colored, (for'ner,)	Mariner,	Went to sea many yrs. since	–	–
Clara Shepherd,	53	"	Gay Head,	–	Lun. Hos. Taunton, (inc'ble	–	–
Mary Ann Shepherd,	16	Single,	"	–	–	–	–
Joseph Stevens,	50	"	"	Mariner,	Gay Head,	–	–
John Terry,‡	22	"	"	"	"	–	–
John Thompson,	33	Married,	"	"	"	–	–
Hannah P. Thompson,	24	"	Marshpee,	–	–	–	–

* Separated from his wife, who, with her son, are on the Marshpee list.

† Sarah A. Peters is since deceased.

‡ Since deceased.

§ Another daughter, Harriet S., born about March, 1860.

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GAY HEAD TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
William A. Vanderhoop,	44	Married,	Col. (for.) from Surinam,	Barber, now farmer,	Gay Head,	4 cattle, 1 swine,	20 acres.
Beulah Vanderhoop,	45	"	Gay Head,	–	"	–	–
Louisa E. Vanderhoop,	21	Single,	"	–	"	–	–
Wm. A. Vanderhoop, Jr.,	19	"	"	–	"	–	–
Paulina A. Vanderhoop,	17	"	"	–	"	–	–
John P. Vanderhoop,	15	Boy,	"	–	"	–	–
Anna E. Vanderhoop,	13	Girl,	"	–	"	–	–
Edwin D. Vanderhoop,	11	Boy,	"	–	"	–	–
Nannette C. Vanderhoop,	9	Girl,	"	–	"	–	–
Cummings B. Vanderhoop,	6	Boy,	"	–	"	–	–
Leonard L. Vanderhoop,	4	"	"	–	"	–	–
Hebron Walmsley,	39	Married,	"	Carpenter,	"	–	5 acres.
Eleanor Walmsley,	38	"	"	–	"	–	–
Celestine Walmsley,	19	Single,	"	–	"	–	–
Tolman Walmsley,	18	Boy,	"	–	"	–	–
Amey Walmsley,	15	Girl,	"	–	"	–	–
Lavinia Walmsley,	12	"	"	–	"	–	–
Hebron Walmsley, Jr.,	10	Boy,	"	–	"	–	–
Valentine Walmsley,	2	"	"	–	"	–	–
Jane Walmsley,	60	Widow,	"	–	"	3 cattle,	7 acres.
Tristram Weeks,	59	Married,	"	Farmer,	"	4 cattle, 3 horses,	12 acres.
Tamezen Weeks,	54	"	"	–	"	3 swine,	–
Elizabeth Weeks,	14	Girl,	"	–	"	–	–
Tristram Weeks, Jr.,	10	Boy,	"	–	"	–	–

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Triphosa Thomas,*	19	Single,	Gay Head,	–	Gay Head,	1 cow,	2 acres.
Thomas Green Cooper,†	22	"	"	Mariner,	"	–	–
John Williams,	61	Married,	Colored, (for.)	Boatman,	"	–	–
Sophronia Williams,	56	"	Gay Head,	–	"	1 swine,	10 acres.

SUPPLEMENTARY LIST.

Bathsheba Aucouch,	47	–	Gay Head,	–	New Bedford.	–	–
Daniel Deming,	45	Married,	Colored, (for.)	Bricklayer,	–	–	–
Mary A. Deming,	42	"	Gay Head,	–	–	–	–
Mary S. Deming,	17	Single,	"	–	–	–	–
Charles W. Deming,	16	Boy,	"	–	–	–	–
Alice J. Deming,	14	Girl,	"	–	–	–	–
Daniel Deming, Jr.,	12	Boy,	"	–	–	–	–
Dyer W. Deming,	9	"	"	–	–	–	–
Angeline C. Deming,	6	Girl,	"	–	–	–	–
Catherine Francis,	35	Single,	"	–	Chilmark,	–	10 acres in Chilmark.
Jemima Francis,	13	Girl,	"	–	"	–	–
Olive Francis,	13	"	"	–	"	–	–
Daniel W. Francis,	7	Boy,	"	–	"	–	–
Eugene Francis,	5	"	"	–	"	–	–
James E. Henry,	33	Married,	Colored, (for.)	Mariner,	New Bedford,	–	–
Jane E. Henry,	37	"	Gay Head,	–	"	–	–
Mary Almy Henry,	15	Girl,	"	–	"	–	–

* Daughter of Tamezen Weeks, by first husband.

† Brother of Tamezen Weeks.

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MARSHPEE TRIBE.

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Personal Property.	Acres of Land in severalty.	Value of Land.	Value of Land and Buildings.
Solomon Attaquin,	49	Married,	Marshpee,	Farmer,	Marshpee,	$488	86	$1,468	$2,618
Cynthia Attaquin,	45	"	Herring Pond,	–	"	–	61*	530	–
Nancy Estella Attaquin,	3	Girl,	Marshpee,	–	"	–	–	–	–
Lewis Ellis Attaquin,	15	Boy,	"	–	"	20	118½	592	–
Sarah Attaquin,	70	Widow,	"	–	"	–	135	775	1,075
Benjamin J. Attaquin,	46	Widower,	"	Mariner,	"	–	135	900	1,845
Pamela Attaquin,	11	Girl,	"	–	"	–	–	–	–
Persis A. Attaquin,	8	"	"	–	"	–	–	–	–
Matthias Amos,	43	Married,	"	Mariner,	"	265	180	1,800	2,550
Clarissa Amos,	41	"	"	–	"	–	–	–	–
Clarinda C. Amos,†	15	Single,	"	–	"	–	–	–	–
Aurelius E. Amos,	8	Boy,	"	–	"	–	–	–	–
Horatio M. Amos,	5	"	"	–	"	–	–	–	–
Celina H. Amos,	9 mos.	Girl,	"	–	"	–	–	–	–
Delia Amos,	38	Widow,	"	–	"	–	60	300	–
Elizabeth Amos,	5	Girl,	"	–	"	–	–	–	–
Lucinda Amos,	3	"	"	–	"	–	–	–	–
James Amos,	51	Married,	"	Mariner,	"	86	175	1,400	2,325
Persis Amos,	42	"	"	–	"	–	·	–	–
Israel Amos,	70	"	"	Mariner,	"	–	120	1,200	1,320
Polly Amos,	67	"	"	–	"	–	–	–	–

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David Robbins,‡	29	Single,	Marshpee,	Mariner,	Marshpee,	–	–	–	–
Naomi Amos,	63	Widow,	"	–	"	–	263	$1,575	$1,875
Betsy Smith,	93	"	"	–	"	–	–	–	–
Daniel Q. Amos,	22	Married,	"	Mariner,	"	–	61	366	–
Adriana F. Amos,	22	"	"	–	"	–	–	–	–
Franklin H. Amos,	9 mos.	Boy,	"	–	"	–	–	–	–
Joseph Amos,§	54	Married,	"	Blind, Preacher,	Nantucket,	–	150	900	1,200
Phebe R. Amos,	40	"	"	–	"	–	–	–	–
Rebecca C. Amos,‖	24	Single,	"	–	"	–	10	70	–
Sarah B. Amos,	16	"	"	–	"	–	10	70	–
Cordelia B. Amos,	14	"	"	–	"	–	10	70	–
Benjamin F. Amos,	11	Boy,	"	–	"	–	–	–	–
Sampson E. Alvis,	58	Married,	"	Farmer,	Marshpee,	–	120	720	920
Hannah G. Alvis,	57	"	"	–	"	–	–	–	–
Ezekiel Alvis,[1]	25	Single,	"	Mariner,	"	–	–	–	–
Clarissa Alvis,	14	"	"	–	"	–	–	–	–
Charles F. Alvis,	31	Married,	"	Mariner,	"	–	–	–	–
Jemima Alvis,[2]	25	"	"	–	"	–	–	–	–
Mary Ann Alvis,	7	Girl,	"	–	"	–	–	–	–
Bethiah Alvis,	5	"	"	–	"	–	–	–	–
Kilburn Alvis,†	3	Boy,	"	–	"	–	–	–	–
Ebenezer Alvis,	2 wks.	"	"	–	"	–	–	–	–

* Situated at Herring Pond.
† Since deceased.
‡ Since married to Henrietta Tobey, and has a son, born in November, 1860.
§ Since returned to Marshpee with all his family.
‖ Since married to Watson Hammond.
[1] Since married to Lucy Ann Caesar.
[2] Has separated from her husband, and since married to Joseph Quippish.

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MARSHPEE TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Personal Property.	Acres of Land in severalty.	Value of Land.	Value of Land and Buildings.
William H. Butler,	33	Married,	African, (for.)	Shoemaker,	Marshpee,	–	60	$300	–
Sarah H. Butler,	32	"	Marshpee,	–	"	–	–	–	–
Ida Butler,	9 mos.	Girl,	"	–	"	–	–	–	–
John D. Brown,	45	Married,	Colored, (for.)	Farmer,	"	$114	75	415	$700
Sarah Brown,	51	"	Marshpee,	–	"	–	–	–	–
Azariah G. Brown,	13	Boy,	"	–	"	–	–	–	–
Emeline F. Brown,	11	Girl,	"	–	"	–	–	–	–
Sarah A. Brown,	10	"	"	–	"	–	–	–	–
Julia Ann Brown,	18	Single,	(For.,) adopted,	–	"	–	–	–	–
William Brown,	28	Married,	African, (for.)	Mariner,	"	–	–	–	–
Mercy H. Brown,	23	"	Marshpee,	–	"	–	30	300	–
Mary E. Brown,	1½	–	"	–	"	–	–	–	–
Martha Keeter,	56	Widow,	"	–	"	–	–	–	–
Noah Keeter,	32	Single,	"	Laborer,	"	–	–	–	–
John Baker,	35	Married,	"	Mariner,	New Bedford,	–	60	240	–
Charlotte M. Baker,	35	"	Chappequiddick,	–	"	–	–	–	–
Nancy Brooks,*	48	Widow,	Marshpee,	–	Yarmouth,	–	75	300	–
Ophelia Cesar,	75	"	"	–	Marshpee.	–	–	–	–
Oakes A. Coombs,	51	Married,	"	Farmer,	"	–	210	1,700	1,900
Dinah B. Coombs,	36	"	"	–	"	–	–	–	–
George Russell Coombs,	15	Boy,	"	–	"	–	–	–	–

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Darius Coombs,	13	Boy,	Marshpee,	–	Marshpee,	–	–	–	–
Daniel C. Coombs,	13	"	"	–	"	–	–	–	–
Oakes Coombs,	4	"	"	–	"	–	–	–	–
William Ceturn,	26	Single,	"	Mariner,	"	–	140	$700	–
Sylvia Casco,	70	Widow,	Middleborough,	State pauper,	"	–	–	–	–
Jeremiah Cowett,	58	Widower,	Marshpee,	Farmer,	"	–	120	480	$480
Louisa A. Cowett,	33	Single,	"	–	"	–	–	–	–
John H. Cowett,	29	"	"	Mariner,	"	–	–	–	–
Esther Cowett,	24	"	"	–	"	–	–	–	–
Sarah E. Cowett,	21	"	"	–	"	–	–	–	–
James F. Cowett,	18	"	"	Mariner,	"	–	–	–	–
Nancy E. Cowett,	16	"	"	–	"	–	–	–	–
Fontenella S. Cowett,	13	"	"	–	"	–	–	–	–
John Henry Cowett,	1	Boy,	"	–	"	–	–	–	–
Lois Pells,	93	Widow,	"	–	"	–	–	–	–
Lucy Ann Carsar,†	29	"	"	–	"	–	75	450	–
Lucy Ann Carsar,	11	Girl,	"	–	"	–	75	450	–
Aurelia Carsar,	8	"	"	–	"	–	–	–	–
Samuel Cowett,	32	Married,	"	Laborer,	"	–	60	180	–
Esther Cowett,	39	"	"	–	"	–	–	–	–
Jacob Cowett,	13	Boy,	"	–	"	–	–	–	–
Charles DeGrasse,	54	Single,	"	Crippled,	"	–	100	300	350
Elias DeGrasse,	44	"	"	Mariner,	"	–	100	400	700
Simon Edwards,	50	"	"	"	"	–	60	300	–

* Belongs now to Yarmouth, and resides there.

† Since married to Ezekiel Alvis.

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MARSHPEE TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Personal Property.	Acres of Land in severalty.	Value of Land.	Value of Land and Buildings.
Mercy Edwards,	70	Widow,	Marshpee,	–	Sandwich,	–	90	$360	–
Spencer Edwards,	41	Married,	"	Mariner,	"	–	150	450	–
Ophelia Edwards,	45	"	"	–	"	–	–	–	–
Esther C. Edwards,	21	Single,	"	–	"	–	–	–	–
Mary A. Edwards,	19	"	"	–	"	–	–	–	–
Susan Bowyer,	19	"	"	–	"	–	–	–	–
Henry Bowyer,	16	Boy,	"	–	"	–	–	–	–
James Bowyer,	15	"	"	–	"	–	–	–	–
Marianne Edwards,	9	Girl,	"	–	"	–	–	–	–
Sarah A. Edwards,	8	"	"	–	"	–	–	–	–
Betsy E. Edwards,	3	"	"	–	"	–	–	–	–
William H. Edwards,	2	Boy,	"	–	"	–	–	–	–
Albert F. Edwards,	6 mos.	"	"	–	"	–	–	–	–
Peter S. Foller,*	51	Married,	"	Mariner,	Marshpee,	$90	140	1,120	$1,195
Dinah T. Foller,	59	"	"	–	"	–	–	–	–
William Freeman,	–	"	African, (for.)	–	New York,	–	180	1,260	–
Ruth Freeman,	52	"	Marshpee,	–	"	–	–	–	–
James Gardner,	23	Single,	"	Laborer,	New Bedford,	–	80	400	–
Wm. H. Gardner,* about	35	Married,	Colored, (for.)	Mariner,	Providence, R. I.	–	–	–	–
Mary Gardner,	35	"	Marshpee,	–	" "	–	–	–	–
Samuel M. Godfrey,	41	"	Colored, (for.)	Mariner,	Marshpee,	–	25	375	650
Hannah Godfrey,	38	"	Marshpee,	–	"	–	–	–	–

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Lysander D. Godfrey,	17	Boy,	Marshpee,	—	Marshpee.	—	—	—	—	—	—	—
Alonzo Godfrey,	15	"	"	—	"	—	—	—	—	—	—	—
Melissa E. Godfrey,	14	Girl,	"	—	"	—	—	—	—	—	—	—
James M. Godfrey,	12	Boy,	"	—	"	—	—	—	—	—	—	—
Susan B. Godfrey,	10	Girl,	"	—	"	—	—	—	—	—	—	—
Frances E. Godfrey,	7	"	"	—	"	—	—	—	—	—	—	—
Ann Godfrey,	8 mos.	"	"	—	"	—	—	—	—	—	—	—
Oliver Gardner,†	23	Single,	"	Mariner,	"	—	—	30	$120	—	—	—
Leah Gardner,	15	"	"	—	"	—	—	30	120	—	—	—
Roland Gardner,	8 mos.	Boy,	"	—	"	—	—	—	—	—	—	—
Watson Hammond,‡	22	Single,	"	Mariner,	"	—	—	30	180	—	—	—
John Hendricks,	51	Married,	Colored, (for.)	"	"	—	—	—	—	—	—	—
Chloe Hendricks,	53	"	Marshpee,	—	"	—	—	60	360	$400	$400	—
Isaac Hendricks,§	23	Single,	"	Mariner,	"	—	—	—	—	—	—	—
Hannah Hersh,	76	"	"	—	Hyannis,	—	—	—	—	—	—	—
Sally Hersh,	71	"	"	—	"	—	—	—	—	—	—	—
John Holmes,	28	Married,	"	Mariner,	St. Johns, N. B.	—	—	—	—	—	—	—
—— Holmes, (his wife,)		"	(foreigner,)	—	"	—	—	—	—	—	—	—
William W. Holland,	66	"	Colored, (for.)	Farmer,	Marshpee.	—	—	—	—	—	—	—
Sally Holland,	27	"	Marshpee,	—	"	—	—	80	400	576	576	—
Francis Hicks,	70	"	Colored, (for.)	Farmer,	"	$250	—	—	—	—	—	—
Bathsheba Hicks,	65	"	Marshpee,	—	"	—	—	60	366	616	616	—

* Since deceased.

† Since married to Harriet Rollins.

§ Since married to Isabella R. Whiting, but now a widower.

‡ Since married to Rebecca T. Amos.

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MARSHPEE TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Personal Property.	Acres of Land in severalty.	Value of Land.	Value of Land and Buildings.
Abner Hicks,	75	Married,	Colored, (for.)	Farmer,	Marshpee,	$175	–	–	–
Sally Hicks,	75	"	Marshpee,	–	"	–	180	$1,080	$1,330
Eleanor B. Hicks,	34	Single,	"	–	"	–	–	–	–
Amanda M. Hicks,	12	Girl,	"	–	"	–	–	–	–
Frankie Hicks,	7	Boy,	"	–	"	–	–	–	–
Mercy A. Hicks,	4 mos.	Girl,	"	–	"	–	–	–	–
Horace A. Hicks,	15	Boy,	"	–	"	–	30	90	–
Andrew Hicks,	12	"	"	–	"	–	30	90	–
Mary T. P. Low,	19	Single,	"	–	"	–	20	80	–
Ariel F. Low,	17	Boy,	"	–	"	–	20	80	–
Susanna A. Low,	15	Girl,	"	–	"	–	20	80	–
Carmeta F. Low,	12	"	"	–	"	–	20	80	–
Cornelius E. Low,	6	Boy,	"	–	"	–	20	80	–
Hannah P. Low,	3	Girl,	"	–	"	–	20	80	–
Hebron Hicks,	43	Married,	"	Miner,	California,	–	60	180	–
Mercy Hicks,	44	"	"	–	Marshpee,	–	60	180	–
Thomas L. Hicks,	16	Boy,	"	–	"	–	–	–	–
Melora E. Hicks,	15	Girl,	"	–	"	–	–	–	–
Christopher Hinson,	77	Married,	"	Farmer,	"	–	60	220	260
Susanna Hinson,	77	"	–	–	"	–	–	–	–
Hezekiah Jackson,	32	"	Colored, (for.)	Laborer,	"	–	–	–	–
Jerusha Jackson,	22	"	Marshpee,	–	"	–	60	300	325
Lafayette Jackson,	3	Boy,	"	–	"	–	–	–	–
Fanny L. Jackson,	1	Girl,	"	–	"	–	–	–	–

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Betsy James,	35	Widow,	Marshpee,	–	Marshpee,	–	53½	$214	–
John Thompson,	19	Boy,	"	–	"	–	–	–	–
Lydia Thompson,*	16	Single,	"	–	"	–	–	–	–
Hannah Thompson,	14	"	"	–	"	–	–	–	–
Lydia Jackson,	74	Widow,	"	–	"	$40	60	180	$280
Thomas Jonas,	49	Married,	Colored, (for.)	Jobber,	"	40	–	–	–
Rosanna Jonas,	42	"	Marshpee,	–	"	–	80	560	685
Frederick D. Jonas,	8	Boy,	"	–	"	–	–	–	–
Infant,†		Girl,	–	–	"	–	–	–	–
Lisburn Johnson,‡	67	Married,	Colored, (for.)	State pauper,	"	–	–	–	–
Nancy Johnson,	45	"	Marshpee,	–	"	60	161	1,044	1,494
William Jones,	50	"	"	Miner,	California,	–	120	360	–
Antoniette Jones,		"	Colored, (for.)	–	Portland, Me.	–	–	–	–
George H. Jones,	22	Single,	Marshpee,	–	" "	–	–	–	–
Wm. Alexander Jones,	20	"	"	–	" "	–	–	–	–
Sarah Louisa Jones,	18	"	"	–	" "	–	–	–	–
Axcy Jones,	41	Widow,	"	–	Marshpee,	–	135	1,080	1,325
Mary S. Jones,	11	Girl,	"	–	"	–	–	–	–
Almira B. Jones,	9	"	"	–	"	–	–	–	–
Caroline F. Jones,	8	"	"	–	"	–	–	–	–
Samuel R. Jones,	5	Boy,	"	–	"	–	–	–	–
Abby F. Jones,	3	Girl,	"	–	"	–	–	–	–
Mary H. Jones,	35	Widow,	"	–	"	47	140	910	1,185
Oliver F. Jones,	10	Boy,	"	–	"	–	–	–	–
Ann M. Jones,	8	Girl,	"	–	"	–	–	–	–

* Since married to Silas P. Pells.

† Since deceased.

‡ He has since ceased to be a public charge.

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MARSHPEE TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Personal Property.	Acres of Land in severalty.	Value of Land.	Value of Land and Buildings.
Aaron Keeter,	54	Married,	Marshpee,	Laborer,	Marshpee,	–	–	–	–
Mary Keeter,	47	"	"	–	"	$105	160	$480	$530
James J. Keeter,	21	Single,	"	Mariner,	"	–	–	–	–
J. Sylvester Keeter,	15	Boy,	"	–	"	–	–	–	–
Edmund Keeter,	11	"	"	–	"	–	–	–	–
Lorenzo Keeter,	9	"	"	–	"	–	–	–	–
Simon W. Keeter,	42	Married,	"	Farmer,	"	75	210	1,050	1,250
Lydia Keeter,	40	"	"	–	"	–	–	–	–
Elizabeth Keeter,	8	Girl,	"	–	"	–	–	–	–
Benjamin Keeter,	4	Boy,	"	–	"	–	–	–	–
Lucy Keeter,	4	Girl,	"	–	"	–	–	–	–
Rachel A. Keeter,*	2	"	"	–	"	–	–	–	–
Abigail Keeter,	3 mos.	"	"	–	"	–	–	–	–
Nicholas P. Keeter,	32	Married,	"	Jobber,	"	–	120	480	–
Diana Keeter,	35	"	"	–	"	–	–	–	–
John Kennedy,	27	"	"	Farmer and mariner,	"	–	60	240	315
Hepzibah J. Kennedy,	23	"	"	–	"	–	–	–	–
Sarah Kennedy,	2 mos.	Girl,	"	–	"	–	–	–	–
James A. Lippett,	57	Married,	Colored, (for.)	Miner,	California,	–	–	–	–
Sarah Lippett,	51	"	Marshpee,	–	Marshpee,	–	60	180	220
Richard Layton,	50	Married,	Colored, (for.)	Barber,	Boston,	–	120	–	–
Lucy A. Layton,	39	"	Marshpee,	–	"	–	–	–	–

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William Henry Layton,	21	Single,	Marshpee,	Barber,	Boston,	—	—	—	—	—
Theodore G. Layton,	15	Boy,	"	—	"	—	—	—	—	—
Ebenezer Low,	87	Married,	Colored, (for.)	Farmer,	Marshpee,	$165	120	$936	$1,261	—
Celia Low,	66	"	Marshpee,	—	"	—	—	—	—	—
Roxana Manning,	37	—	"	—	"	—	—	—	—	—
Marshall Manning,	13	Boy,	"	—	"	—	—	—	—	—
Charles Lee,	36	Married,	"	Mariner,	New York,	—	120	480	—	—
—— Lee, (his wife,)	—	"	Unknown,	—	"	—	—	—	—	—
William Lee,	34	"	Middleboro',	Mariner,	Absent in Califor.,	—	—	—	—	—
Emeline Lee,	38	"	Marshpee,	—	Marshpee,	—	—	—	—	—
Charlotte Lyons,	26	Widow,	Unknown,	—	New Bedford,	—	—	—	—	—
Harriet Frances Lyons,	10	Girl,	"	—	"	—	—	—	—	—
Jeanette F. Lyons,	7	"	"	—	"	—	—	—	—	—
John Mashow,†	54	Married,	Colored, (for.)	Shipwright,	Dartmouth,	—	60	480	—	—
Hope Mashow,	49	"	Marshpee,	—	"	—	—	—	—	—
Mary F. Mashow,	26	Single,	"	—	"	—	—	—	—	—
Isaac H. Mashow,	23	"	"	—	"	—	—	—	—	—
Emily O. Mashow,	18	"	"	—	"	—	—	—	—	—
John Albert Mashow,	16	Boy,	"	—	"	—	—	—	—	—
Maria A. Mashow,	14	Girl,	"	—	"	—	—	—	—	—
Charles W. Mashow,	12	Boy,	"	—	"	—	—	—	—	—
Ellen M. Mashow,	10	Girl,	"	—	"	—	—	—	—	—
George A. Mashow,	8	Boy,	"	—	"	—	—	—	—	—
Frank E. Mashow,	4	"	"	—	"	—	—	—	—	—
Eliza B. Mashow,	2	"	"	—	"	—	—	—	—	—

* Since deceased.

† One more child since born, about August, 1860, a girl.

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MARSHPEE TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Personal Property.	Acres of Land in severalty.	Value of Land.	Value of Land and Buildings.
Charles D. Mingo,	54	Married,	Colored, (for.)	State Pauper,	Marshpee.	–	–	–	–
Sarah Mingo,*	62	"	Marshpee,	–	"	–	–	–	–
Franklin Goodwin,	29	Single,	"	Steam-boat hand,	Holmes' Hole.	–	–	–	–
Walter Mingo,	21	Married,	"	Mariner,	"	–	140	$639	–
Frances Mingo,	26	"	"	–	"	–	–	–	–
George Henry Mingo,	2	Boy,	"	–	"	–	–	–	–
Dorcas Mills,	36	Widow,	"	–	Marshpee.	–	–	–	–
William J. Mills,	16	Boy,	"	–	"	–	–	–	–
James S. Mills,	15	"	"	–	"	–	–	–	–
Elizabeth S. Mills,	13	Girl,	"	–	"	–	–	–	–
Lewis Mills,	11	Boy,	"	–	"	–	–	–	–
Ophelia P. Mills,	7	Girl,	"	–	"	–	–	–	–
David Mye,	55	Married,	"	Mariner,	"	$15	120	600	$850
Margery Mye,	42	"	"	–	"	–	–	–	–
Adeline B. Gardner,	17	Single,	"	–	"	–	–	–	–
Ella Florence Gardner,	1	Girl,	"	–	"	–	–	–	–
James F. Mye,†	39	Single,	"	Mariner,	"	–	20	120	–
Thomas Mye,	31	"	"	"	"	–	20	120	–
William F. Mye,‡	29	"	"	"	"	–	20	120	–
Susan Mye,	42	"	"	–	Portland, Me.,	–	60	180	–
George T. Ockry,	41	Married,	"	Farmer,	Marshpee,	88	60	382	907
Betsy J. Ockry,	38	"	"	–	"	–	–	–	–

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Euphrasia A. Ockry,	15	Single,	Marshpee,	—	Marshpee,	—	—	—	—	—	—	—
James A. Ockry,	11	Boy,	"	—	"	—	—	—	—	—	—	—
George L. Ockry,	7	"	"	—	"	—	—	—	—	—	—	—
Gertrude C. Ockry,	4	Girl,	"	—	"	—	—	—	—	—	—	—
Martha C. Ockry,	2	"	"	—	"	—	—	—	—	—	—	—
Addie B. Ockry,	1	"	"	—	"	—	—	—	—	—	—	—
James F. Pells,	19	Single,	"	Mariner,	"	—	—	—	—	—	—	—
Moses Pocknet,	60	Married,	"	Farmer,	"	$213	160	$640	$740			
Mercy S. Pocknet,	50	"	"	—	"	—	—	—	—			
Alexander D. Pocknet,	29	Single,	"	Mariner,	"	—	—	—	—			
Grafton G. Pocknet,	23	"	"	"	"	—	—	—	—			
Susan Pocknet,	20	"	"	—	"	—	—	—	—			
Reliance Pocknet,§	17	"	"	—	"	—	—	—	—			
Henrietta Pocknet,	15	"	"	—	"	—	—	—	—			
Triphosa Pocknet,	13	"	"	—	"	—	—	—	—			
Timothy Pocknet,	55	Married,	"	Mariner,	"	—	80	400	450			
Mary Ann Pocknet,	47	"	"	—	"	—	120	540	615			
Russell Brown,	16	Boy,	"	—	"	—	—	—	—			
Nathan S. Pocknet,	50	Married,	"	Mariner,	"	—	150	900	1,100			
Elizabeth Pocknet,	26	"	"	—	"	—	30	120	—			
Zaccheus Pocknet,	7	Boy,	"	—	"	—	—	—	—			
Benjamin F. Pocknet,	6	"	"	—	"	—	—	—	—			
Angeline Pocknet,	4	Girl,	"	—	"	—	—	—	—			
Teresa Pocknet,	2	"	"	—	"	—	—	—	—			
Edward Pocknet,	Inf.	Boy,	"	—	"	—	—	—	—			

* Died in 1860.

‡ Since married to Roxana Manning, undivorced wife of Alvan Manning, of Gay Head.

† Since married to Eliza Gardner of Herring Pond.

§ Since married to Jacob Pocknet.

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MARSHPEE TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Personal Property.	Acres of Land in severalty.	Value of Land.	Value of Land and Buildings.
Gideon N. Pocknet,	50	Married,	Marshpee,	Jobber,	Marshpee,	–	197	$985	$1,010
Mahala B. Pocknet,	37	"	"	–	"	–	–	–	–
Jacob Pocknet,*	21	Single,	"	Mariner,	"	–	–	–	–
Sarah Ann Pocknet,	18	"	"	–	"	–	–	–	–
Celia R. Pocknet,	17	"	"	–	"	–	–	–	–
Eusebia Pocknet,	15	"	"	–	"	–	–	–	–
Lucinda Pocknet,	11	Girl,	"	–	"	–	–	–	–
Edgar Pocknet,	8	Boy,	"	–	"	–	–	–	–
Emma Frances Pocknet,	7	Girl,	"	–	"	–	–	–	–
Henry C. Pocknet,	5	Boy,	"	–	"	–	–	–	–
Joshua Pocknet,	40	Married,	"	Mariner,	California,	–	140	840	870
Harriet Pocknet,	40	"	"	–	–	–	–	–	–
Elijah W. Pocknet,	39	Married,	"	Farmer,	Marshpee,	–	120	420	820
Phebe A. Pocknet,	30	"	"	–	"	–	–	–	–
Olivia T. Pocknet,	9	Girl,	"	–	"	–	–	–	–
Phebe E. Pocknet,	7	"	"	–	"	–	–	–	–
Elijah W. Pocknet, Jr.,	5	Boy,	"	–	"	–	–	–	–
Joshua A. Pocknet,	3	"	–	–	–	–	–	–	–
John Pompey,	40	Married,	"	Mariner,	Cotuit Port,	–	80	480	530
Elizabeth Pompey,	33	"	White, (for'gner)	–	"	–	–	–	–
Angelia F. Pompey,	9	Girl,	Marshpee,	–	"	–	–	–	–
Cynthia A. Pompey,	7	"	"	–	"	–	–	–	–
Caroline Pompey,	5	"	"	–	"	–	–	–	–
Edward Pompey,	1 mo.	Boy,	"	–	"	–	–	–	–

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Dives Quippish,	70	Widower,	Marshpee,	Farmer,	Marshpee,	–	260	$1,300	$1,400
Daniel Quippish,	68	"	"	"	"	$95	63	378	503
Joseph Quippish,†	29	Single,	"	"	"	–	30	180	–
Harriet Rollins,‡	28	Widow,	"	–	"	–	134	670	–
Thomas G. Sewall,	40	Married,	Colored, (for.)	Farmer, form'ly Barber,	"	180	–	–	–
Ann Sewall,	40	"	"	–	"	–	65	510	1,060
Matilda Simon,	66	Widow,	Marshpee,	–	"	–	14	84	–
Martha Ann Mye,	13	Girl,	"	–	"	–	20	60	–
Anna Maria Mye,	11	"	"	–	"	–	20	60	–
Mehitable S. Mye,	9	"	"	–	"	–	20	60	–
William Henry Simon,	37	Married,	"	Mariner,	"	140	192	1,344	1,644
Lucy M. Simon,	33	"	"	–	"	–	–	–	–
Daniel S. Simon,	11	Boy,	"	–	"	–	–	–	–
Melinda E. Simon,	9	Girl,	"	–	"	–	–	–	–
Mehitable P. Simon,	8	"	"	–	"	–	–	–	–
Wm. Henry Simon, Jr.,	7	Boy,	"	–	"	–	–	–	–
Lucy L. Simon,	4	Girl,	"	–	"	–	–	–	–
Azubah A. Simon,	2	"	"	–	"	–	–	–	–
Isaac Simon,	6 mos.	Boy,	"	–	"	–	–	–	–
William Simmons,	65	Married,	Colored, (for.)	Farmer,	"	–	–	–	–
Patience Simmons,	40	"	Marshpee,	–	"	–	60	240	–
Sarah R. Simpson,§	–	"	"	–	"	–	60	180	–

* Since married to Reliance Pocknet.

† Since married to Jemima Alvis, undivorced wife of Charles F. Alvis.

‡ Since married to Oliver Gardner.

§ Belongs by marriage and residence to Chappequiddick.

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MARSHPEE TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Personal Property.	Acres of Land in severalty.	Value of Land.	Value of Land and Buildings.
Susan Stanley,	33	Widow,	Marshpee,	–	Marshpee.	–	–	–	–
Kate Stanley,	12	Girl,	"	–	"	–	–	–	–
Ann Stanley,	10	"	"	–	"	–	–	–	–
Frank Stanley,	8	Boy,	"	–	"	–	–	–	–
John Thompson,	28	Married,	Gay Head,	Mariner,	"	–	–	–	–
Hannah P. Thompson,	23	"	Marshpee,	–	"	–	–	–	–
Joseph Tobey,	62	Married,	"	Farmer,	"	$85	120	$720	$870
Jedida Tobey,	60	"	"	–	"	–	–	–	–
Oakes A. Tobey,	28	Single,	"	Mariner,	"	–	–	–	–
Sylvanus Tobey,	26	"	"	"	"	–	–	–	–
Margaret Tobey,	22	"	"	–	"	–	–	–	–
Joseph Tobey, Jr.,	42	Married,	"	Farmer,	"	75	150	750	800
Leah Tobey,	38	"	"	–	"	–	–	–	–
Henrietta Tobey,*	21	Single,	"	–	"	–	–	–	–
Sarah Tobey,	19	"	"	–	"	–	–	–	–
John Tobey,	16	"	"	–	"	–	–	–	–
Jedida Tobey,	14	"	"	–	"	–	–	–	–
Ephraim Tobey,	37	Married,	"	Mariner,	"	–	60	300	400
Philena Tobey,	24	"	"	–	"	–	–	–	–
Sidney Tobey,	5	Boy,	"	–	"	–	–	–	–
Corinne Tobey,	4	Girl,	"	–	"	–	–	–	–
Margaret Tobey,	2	"	"	–	"	–	–	–	–
Alphonso Tobey,	6 mos.	Boy,	"	–	"	–	–	–	–

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Stephen Van Renssellaer,	28	Married,	Colored, (for.)	Mariner,	Marshpee.	–	–	–	–
Louisa G. Van Renssellaer,	33	"	Marshpee,	–	"	–	30	$120	–
Josephine Williams,	12	Girl,	"	–	"	–	–	–	–
John Vallou,	26	Married,	Colored, (for.)	Mariner,	Holmes' Hole.	–	–	–	–
Sarah Vallou,	23	"	Marshpee,	–	"	–	–	–	–
Bradford Vallou,	9	Boy,	"	–	"	–	–	–	–
Clarissa Mingo,	20	Single,	"	–	"	–	–	–	–
Sarah F. Mingo,	1½	Girl,	"	–	"	–	–	–	–
Jesse Webquish,	76	Married,	"	Farmer,	Marshpee.	–	180	900	$1,050
Prudence P. Webquish,	57	"	"	–	"	–	–	–	–
Jesse Webquish, Jr.,†	33	Married,	"	Mariner,	New Bedford.	–	–	–	–
Rebeeca J. Webquish,	27	"	"	–	Marshpee.	–	–	–	–
Estella B. Webquish,	4	Girl,	"	–	"	–	–	–	–
Levi S. Webquish,	29	Married,	"	Mariner,	"	–	–	–	–
Anna F. Webquish,	25	"	"	–	"	–	10	70	–
Levi Webquish,	8	Boy,	"	–	"	–	–	–	–
Thaddeus Wickham,	10	"	"	–	"	–	25	75	–
William Webquish,	28	Married,	"	Mariner,	"	–	30	120	–
Minerva Webquish,	31	"	"	–	"	–	–	–	–
Ferdinand Webquish,	3	Boy,	"	–	"	–	–	–	–
Nancy Williams,	66	Widow,	"	–	"	–	60	240	465
John H. Webster,	–	Married,	Colored, (for.)	Mariner,	Plymouth.	–	–	–	–
Ruth R. Webster,	27	"	Marshpee,	–	"	–	–	–	–
Infant,	–	–	"	–	"	–	–	–	–

* Since married to David Robbins.

† Jesse Webquish, Jr., and his wife have separated, and he has since married another woman at New Bedford, who calls her name Emeline Webquish, by whom he has a daughter, two years old, named Louisa H.; but, as he has never been divorced, the latter marriage is, of course, void, and the issue thereof, consequently illegitimate.

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MARSHPEE TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Personal Property.	Acres of Land in severalty.	Value of Land.	Value of Land and Buildings.
Jane A. Whiting,	50	Widow,	Marshpee,	–	Marshpee,	–	53	$159	$234
Isabella F. Whiting,*	23	Single,	"	–	"	–	–	–	–
Lauretta L. Whiting,	17	"	"	–	"	–	–	–	–
Iantha Whiting,	2	Girl,	"	–	"	–	–	–	–
Gilbert Whiting, infant,		Boy,	"	–	"	–	–	–	–
David Wilbur,	76	Widower,	"	Farmer,	"	$80	102	408	458
Joseph Wilbur,	36	Single,	"	Mariner,	"	–	–	–	–
James Wilbur,	29	"	"	"	"	–	–	–	–
John Young,	50	Married,	Colored, (for.)	Farmer,	"	30	220	880	1,080
Mary R. Young,	43	"	Marshpee,	–	"	–	–	–	–
Anstis Young,†	18	Single,	"	–	"	–	–	–	–
Fanny R. Young,†	15	"	"	–	"	–	–	–	–
Maria Antoniette Young,†	7	Girl,	"	–	"	–	–	–	–
John Young, Jr.,†	5	Boy,	"	–	"	–	–	–	–
Lydia Ann Young,	3 mos.	Girl,	"	–	"	–	–	–	–
James Henry Pells,	24	Single,	"	Mariner,	"	–	–	–	–
Silas Parker Pells,‡	21	"	"	"	"	–	–	–	–
Foster L. Pells,	19	"	"	"	"	–	–	–	–
Olive G. Pells,	15	"	"	–	"	–	–	–	–
Mary F. Pells,	13	"	"	–	"	–	–	–	–
Gustavus D. Pells,	11	Boy,	"	–	"	–	–	–	–
Leah Quippish,	46	Widow,	"	–	"	–	204	1,428	1,453
James A. Lewis,	17	Boy,	"	–	"	–	–	–	–

* Since married to Isaac Hendricks but subsequently deceased.

‡ Since married to Lydia Thompson.

† Those with this mark are children of John Young, by a former wife. Those which follow are children of Mary R. Young; those named Pells, by Jacob Pells, her first husband.

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SUPPLEMENTARY LIST.

In addition to the foregoing, are several persons, who either left Marshpee previous to the division of the land, or are descendants of such, but who are not recognized as having rights in Marshpee, among whom are the following:—

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Personal Property.	Acres of Land in severalty.	Value of Land.	Value of Land and Buildings.
Sarah Brown,	75	Widow,	Marshpee,	–	Wareham.	–	–	–	–
John Jones,	55	Married,	(Foreigner,)	–	"	–	–	–	–
Lucy Jones,	53	"	Marshpee,	–	"	–	–	–	–
James Jones,	19	Single,	"	–	"	–	–	–	–
James Brown,	51	"	"	–	"	–	–	–	–
William Brown,	44	"	"	–	"	–	–	–	–
Maria Smith,	40	Widow,	"	–	"	–	–	–	–
Mary Smith,	20	Single,	"	–	"	–	–	–	–
Andrew Smith,	16	Boy,	"	–	"	–	–	–	–
Isaac Smith,	13	"	"	–	"	–	–	–	–
Fanny Smith,	13	Girl,	"	–	"	–	–	–	–
Oliver Smith,	10	Boy,	"	–	"	–	–	–	–
Emeline Rollins,	25	Widow,	"	–	"	–	–	–	–
Henry Rollins,	18	Boy,	"	–	"	–	–	–	–

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HERRING POND TRIBE.

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Ralph Blackwell,	49	Married,	Herring Pond,	Mariner,	Herring Pond Plantation,	1 cow, 1 heifer,	108¾ acres, $600.‡
Mary A. Blackwell,	31	"	Marshpee,	–	" "	–	–
Eliza A. Jackson,	55	Widow,	Herring Pond,	–	" "	–	–
Ellen E. Folger,	12	Girl,	"	–	" "	–	–
William R. Conet,*	29	Married,	"	Mariner,	" "	1 cow, 1 heifer,	105 acres, $575.
Rhoda F. Conet,	27	"	Marshpee,	–	" "	–	–
Ezra R. Conet,	2	Boy,	Herring Pond,	–	" "	–	–
Solomon B. Conet,†	6 mos.	"	"	–	" "	–	–
Christopher Danzell,	29	Married,	Narragansett,	Cordwainer,	New Bedford.	–	–
Deborah Danzell,	25	"	Herring Pond,	–	"	–	53¾ acres, $167.
Alonzo S. Danzell,	5	Boy,	"	–	"	–	–
Ella Melissa Danzell,	3	Girl,	"	–	"	–	–
Eva F. Danzell,	2	"	"	–	"	–	–
Rosetta Danzell,	3 mos.	"	"	–	"	–	–
James W. Denison,	70	Married,	Mixed, (for'gner)	Mariner,	Nantucket.	–	–
Sarah Denison,	60	"	Herring Pond,	–	"	–	56 acres, $200.
John M. Denison,	29	Single,	"	Mariner,	"	–	–
Susan S. Denison,	25	"	"	–	"	–	–
James W. Denison,	23	"	"	–	"	–	–
William Henry Denison,	18	"	"	–	"	–	–
Alexander G. Denison,	27	Married,	"	Barber,	California.	–	–
Wife,	Unk.	"	Unknown,	–	"	–	–

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Stephen Ellis,	30	Married,	Unknown, (for.)	Barber,	Sandwich.	–	–
Maria E. Ellis,	24	"	Herring Pond,	–	"	–	–
Thomas J. Fletcher,	49	Widower,	"	Carpenter,	Herring Pond Plantation,	–	152 acres, $950.§
Sarah A. Fletcher,	23	Single,	"	–	" "	–	–
Nathan J. Fletcher,	21	"	"	–	" "	–	–
Augustus R. Fletcher,	17	"	"	–	" "	–	–
Julia A. Fletcher,	15	"	"	–	" "	–	–
Peter Fowler,	45	Married,	Nova Scotia,	–	California.	–	–
Mary Fowler,	28	"	Herring Pond,	–	"	–	–
Walter A. Fowler,	10	Boy,	"	–	"	–	–
John C. Gardner,	30	Single,	"	Mariner,	Herring Pond,	–	56½ acres, $226.
Eliza Jane Gardner,‖	22	"	"	–	"	–	29 " 116.
Russell G. Gardner,	15	"	"	Mariner,	"	–	29 " 116.
Thomas Hersch,	63	Married,	Marshpee,	Farmer,	Herring Pond Plantation	1 cow, $30,	60 acres, $600.[1]
Mary Hersch,	60	"	Herring Pond,	–	" "	–	57½ " 285.
Cordelia A. Hersch,	22	Single,	"	–	" "	–	–
Theodore M. Hersch,	20	"	"	Mariner,	" "	–	–
Mary Ann Hersch,	17	"	"	–	" "	–	–
Betsy De Grasse,[2]	36	Married,	"	–	Christiantown,	–	47 acres, $188.
Cyrenus Hersch,	29	"	"	Mariner,	Herring Pond Plantation,	–	55 acres, $800.
Helen F. Hersch,	19	"	"	–	" "	–	29 " 126.
Maria Louisa Hersch,	6 mos.	Girl,	"	–	" "	–	–

* Died in February, 1861.
† Since deceased.
‡ 48¾ acres belonged to a deceased wife.
§ 48½ acres belonging to wife deceased, and 38½ acres belonging to daughter deceased.
‖ Since married to James F. Mye, of Marshpee.
[1] At Marshpee.
[2] Wife of George W. DeGrasse, and is on the Christiantown list.

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HERRING POND TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Salome Johnson,	56	Widow,	Herring Pond,	–	Herring Pond Plantation,	–	54¾ acres, $700.
Anthony Johnson,	21	Single,	"	Mariner,	" "	–	–
George Johnson,	17	Boy,	"	–	" "	–	–
Frederick E. Nickerson,	35	Married,	Yarmouth,	Laborer,	Sandwich.	–	–
Isabella Nickerson,	21	"	Herring Pond,	–	"	–	29 acres, $58.
Ella B. Nickerson,	1	Girl,	"	–	"	–	–
Catherine Parker,	49	Widow,	"	–	Herring Pond Plantation,	–	66¼ acres, $350.
David J. Parker,	14	Boy,	"	–	" "	–	–
Cordelia B. Parker,	8	Girl,	"	–	" "	–	–
Andrew Pratt,	36	Single,	"	Farmer,	" "	–	107¾ acres, $575.
Love Saunders,	52	Widow,	"	–	" "	–	155¼ acres, $850.‡
Dorcas Courtland,	22	Single,	"	–	" "	–	–
Harriet Saunders,	18	"	"	–	" "	–	–
Solomon Webquish,*	37	Widower,	Marshpee,	Laborer,	" "	–	110¾ acres, $1,175.§
Miranda V. Webquish,†	6	Girl,	Herring Pond,	–	" "	–	–
Samuel Wood,	59	Married,	"	Farmer,	" "	–	49¾ acres, $600.
Abigail Wood,	56	"	"	–	" "	–	90½ " 450.
Sarah Thompson,	36	Widow,	"	–	" "	–	61½ " 380.
Samuel F. Wood,	unk'n	Married,	"	Barber,	" "	–	–
Love F. Wood,	29	"	"	–	" "	–	57½ acres, $287.

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Louisa F. Wood,	7	Girl,	Herring Pond,	–	Herring Pond Plantation.	–	–
Charles G. Wood,	6	Boy,	"	–	" "	–	–
Jeanette F. Wood,	4	Girl,	"	–	" "	–	–
Cora T. Wood,	3	"	"	–	" "	–	–

NATICK TRIBE.

Amos A. Blodget,	29	§Married,	White,	Laborer,	Natick.	–	–
Patience Blodget,	30	"	Natick,	–	"	–	–
Eben A. Blodget,	10	Boy,	"	–	"	–	–
Mary H. Blodget,	7	Girl,	"	–	"	–	–
Florence I. Blodget,	2	"	"	–	"	–	–
Cyra Jepherson,‖	53	–	White,	Farmer,	Douglas.	–	–
Patty Pease (Jepherson),	47	–	Natick,	–	"	–	–
Cyra Jepherson, Jr.,	21	Single,	"	–	"	–	–
Appolite J. Jepherson,	19	"	"	–	"	–	–
James M. Jepherson,	16	Boy,	"	–	"	–	–
George C. Jepherson,	15	"	"	–	"	–	–
Anna Maria Jepherson,	11	Girl,	"	–	"	–	–

MIDDLEBOROUGH INDIANS.

Cornelia Hemenway,	45	Widow,	Middleborough,	–	Uncertain.	–	–
Henry Hemenway,	25	Single,	"	Mariner,	"	–	–
Sarah Jane Hemenway,	22	"	"	–	"	–	–

* Since married to a mulatto woman.

§ 46¼ acres belonged to a deceased wife.

† Since deceased.

‡ 52½ acres belonged to a deceased son.

‖ Died November, 1860.

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MIDDLEBOROUGH INDIANS—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Mary Monroe,	18	Single,	Middleborough,	–	New Bedford.	–	–
Jedida Monroe,	15	"	"	–	"	–	–
Sabrina Roman,	45	Widow,	"	–	"	–	–
Lydia Squin,	60	"	"	–	"	–	–
James H. Wing,	38	Single,	"	–	"	–	–
William Lee,	34	Married,	"	–	Uncertain.	–	–
Emeline Lee,	38	"	Marshpee,	–	Marshpee.	–	–

PUNKAPOG INDIANS.

Elizabeth Bancroft,	59	Widow,	Punkapog,	–	Canton.	–	–
Thomas F. Bancroft,	38	Married,	"	Shoemaker,	"	1 cow, $40.	5 acres $150.
Phebe A. Bancroft,	26	"	"	–	"	–	–
Rinaldo Bancroft,	39	"	"	Laborer,	Plymouth.	–	–
Sarah Bancroft,	44	"	Bridgewater,	–	"	–	–
Jeremiah Bancroft,	34	Widower,	Punkapog,	Bootmaker,	Canton,	–	5 acres $150.
Lydia Ann Bancroft,	4	Girl,	"	–	"	–	–
Mary Ella Bancroft,	1	"	"	–	"	–	–

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Hannah Bancroft,	–	Widow,	Colored, (for.)	–	Dedham.	–	–	–	–
John Bancroft,	21	Single,	Punkapog,	Laborer,	"	–	–	–	–
Mary Elizabeth Bancroft,	18	"	"	–	"	–	–	–	–
Sally Burr,	60	Widow,	Colored, (for.)	–	Cambridgeport.	–	–	–	–
Sally Burr,	61	Single,	Punkapog,	State Beneficiary,	"	–	–	–	–
Lemuel Burr,	45	Married,	–	Barber,	"	–	–	–	–
Mary Burr,	39	"	Colored, (for.)	–	"	–	–	–	–
Ann E. Burr,	14	Single,	Punkapog,	–	"	–	–	–	–
Lemuel D. Burr,	12	Boy,	"	–	"	–	–	–	–
Mary M. Burr,	6	Girl,	"	–	"	–	–	–	–
Sally L. Burr,	4	"	"	–	"	–	–	–	–
James Burr,	30	Single,	"	Barber,	Boston.	–	–	–	–
David L. Burrill,	32	Married,	White, (for.)	Bootmaker,	Canton.	–	–	–	–
Olive A. Burrill,	36	"	Punkapog,	–	"	–	–	–	–
Olive Ella Burrill,	9	Girl,	"	–	"	–	–	–	–
Beauty J. Burrill,	3	"	"	–	"	–	–	–	–
Jeremiah M. Burrill,	3 mos.	Boy,	"	–	"	–	–	–	–
Ann Elizabeth Philbrick,	18	Single,	"	–	"	–	–	–	–
Daniel Croud,	65	Married,	"	Farmer,	"	–	1 horse, $40, and 3 cows.	–	45 acres with buildings, $1,500.
Lydia Croud,	53	"	Colored, (for.)	–	"	–	–	–	–
S. P. Maria Croud,	27	Single,	Punkapog,	–	"	–	–	–	–
Caroline H. Croud,	24	"	"	–	"	–	–	–	–
Albert Croud,	12	Boy,	"	–	"	–	–	–	–
John S. Croud,	7	"	"	–	"	–	–	–	–
Edward Robbins,*	20	Single,	Mixed,	–	"	–	–	–	–

* Son of L. Croud by first husband.

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PUNKAPOG INDIANS—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
George Croud,	36	Married,	Punkapog,	Laborer,	Canton.	–	–
M. Emeline Croud,	31	"	"	–	"	–	–
George L. Croud,	6	Boy,	"	–	"	–	–
Arthur E. Croud,	3	"	"	–	"	–	–
Sarah E. Croud,	1	Girl,	"	–	"	–	–
Edwin S. Croud,	34	Married,	"	Barber,	Abington.	–	–
Mary Croud,	25	"	—— (foreigner,)	–	"	–	–
Edwin Croud,	3	Boy,	Punkapog,	–	"	–	–
Frankie Croud,	4 mos.	"	"	–	"	–	–
Polly Croud,	61	Single,	"	–	Cambridgeport.	–	–
Rebecca Davis,	71	Widow,	"	–	Boston.	–	–
James Black,	20	Single,	"	Mariner,	"	–	–
James Elisha,	61	Married,	"	Laborer,	"	–	–
Elizabeth Elisha,	55	"	White, (for.)	–	"	–	–
William Elisha,	31	"	Punkapog,	Laborer,	"	–	–
Harriet M. L. Elisha,	41	"	–	–	"	–	–
James Francis Elisha,	26	"	Punkapog,	Laborer,	"	–	–
Maria Elisha,	30	"	–	–	"	–	–
Addie Elisha,	3	Girl,	–	–	"	–	–
James F. Elisha, Jr.,	9 mos.	Boy,	–	–	"	–	–

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Joseph Elisha,	20	Married,	—	Laborer,	Boston.	—	—	—	—	—	—
Olive Elisha,	22	"	—	—	"	—	—	—	—	—	—
Charles Hall,	22	Single,	—	Barber,	"	—	—	—	—	—	—
Calvin Hunt,	37	Married,	White, (for.)	Laborer,	Canton.	—	—	—	—	—	—
Lucy C. Hunt,	32	"	Punkapog,	—	"	—	—	—	—	—	—
Thomas O. Hunt,	11	Boy,	"	—	"	—	—	—	—	—	—
Albee Hunt,	8	"	"	—	"	—	—	—	—	—	—
Emma L. Hunt,	6	Girl,	"	—	"	—	—	—	—	—	—
Joshua Hunt,	4	Boy,	"	—	"	—	—	—	—	—	—
Phebe F. Hunt,	2	Girl,	"	—	"	—	—	—	—	—	—
Jacob Jackson,	37	Married,	Colored, (for.)	Laborer,	North Bellingham.	—	—	—	—	—	—
Mary Jackson,	44	"	Punkapog,	—	"	—	—	—	—	—	—
Mary Eliza Jackson,	7	Girl,	"	—	"	—	—	—	—	—	—
Eliza Jackson,	39	Widow,	"	—	Mendon.	—	—	—	—	—	—
Sarah E. Jackson,	16	Single,	"	—	"	—	—	—	—	—	—
Rowena Lewis,	62	Widow,	"	—	Dover, N. H.	—	—	—	—	—	—
Adeline Lewis,	22	Single,	"	—	"	—	—	—	—	—	—
Charles Lewis,	20	"	"	—	"	—	—	—	—	—	—
William Manuel,	40	"	"	Barber,	Plymouth.	—	—	—	—	—	—
Albert B. Manuel,	42	Married,	"	Barber,	Lowell.	—	—	—	—	—	—
Lucretia B. Manuel,	47	"	—	—	"	—	—	—	—	—	—
James Manuel,	23	Single,	—	—	"	—	—	—	—	—	—
Lucy H. Manuel,	19	"	"	—	"	—	—	—	—	—	—
William L. G. Manuel,	13	Boy,	"	—	"	—	—	—	—	—	—

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PUNKAPOG INDIANS—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Henry Manuel,	32	Single,	Punkapog,	Barber,	Boston.	–	–
Primus Mooney,	34	Married,	"	Laborer,	Stoughton.	–	–
Mary A. Mooney,	–	"	White, (for.)	–	"	–	–
Susan Mooney,	30	Single,	Punkapog,	–	Woodstock, Vt.	–	–
Harriet Moore,	26	"	"	–	Boston.	–	–
George Moore,	23	"	"	Mariner,	"	–	–
Lavinia Moore,	19	"	"	–	"	–	–
Robert Moore,	16	Boy,	"	–	"	–	–
Charlotte E. Myers,	55	Widow,	"	–	"	–	–
Mary Roby,	85	"	"	–	Woodstock, Vt.	–	–
William Roby,	–	Single,	"	–	California.	–	–
John Smith,	42	Widower,	Colored, (for.)	Caterer,	Boston.	–	–
Kennard Smith,	12	Boy,	Punkapog,	–	"	–	–
Emily Smith,	11	Girl,	"	–	"	–	–
Harriet Smith,	12	"	"	–	"	–	–
Thomas Stemburg,	47	Married,	(Foreigner,)	Barber,	Boston.	–	–
Esther H. Stemburg,	28	"	Punkapog,	–	"	–	–
Sally A. Stemburg,	12	Girl,	"	–	"	–	–

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Joseph Talbot,	35	Married,	Troy,	—	—	—	—	—	—	—	—
Lucy Talbot,	28	"	Punkapog,								
Josephine Talbot,	10	Girl,	"								
Sarah J. Talbot,	8	"	"								
Emma F. Talbot,	6	"	"								
Lucy A. Talbot,	3	"	"								
William Thomas,	53	Married,	Colored, (for.)		Barber,		Uncertain.		—	—	—
Mary Thomas,	50	"	Punkapog,		—		Providence.				
Elizabeth R. Thomas,	22	Single,	"		—		"		—	—	—
George S. Thomas,	19	"	"		—		"		—	—	—
Helen A. Thomas,	17	"	"		—		"		—	—	—
Augustus Toney,	24	Married,	Colored, (for.)		Barber,		Lowell.		—	—	—
Lucretia Toney,	21	"	Punkapog,		—		"		—	—	—
Gertrude Toney,	3	Girl,	"		—		"		—	—	—
Francis Toney,	1 mo.	Boy,	"		—		"		—	—	—
Isaac Williams,	67	Widower,	"		State beneficiary,		Stoughton.		—	—	—
Harriet Williams,	26	Single,	"		—		"		—	—	—
Horatio Foster,*	44	Married,	"		—		Pawtucket.		—	—	—
Mary Ann Foster,	—	"	Narragansett,		—		"		—	—	—
Horatio S. Foster,	about 11	—	Punkapog,		—		"		—	—	—
Mary E. Foster,	about 9	—	"		—		"		—	—	—
Samuel ——,	about 7	—	"		—		"		—	—	—

* Since deceased, in November, 1860.

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FALL RIVER (OR TROY) INDIANS.

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Adam Allen,	76	–	Fall River,	–	–	–	–
Rebecca Allen,	71	–	"	–	–	–	–
Persis Crank,	58	Single,	"	–	Reservation,	–	½ house and 1 acre.
John Simpson,	11	Boy,	"	–	"	–	–
Eunice Crank,	48	Single,	"	–	"	–	–
William H. Crank,	32	"	"	Laborer,	"	–	–
James Crank,	26	"	"	"	Insane Hospital Taunton.	–	–
Henry Crank,	45	"	"	"	Reservation,	–	½ house and 3 acres.
Sarah Crank,*	61	Widow,	Mulatto, (for.)	–	"	–	–
Thomas M. Crank,	29	Married,	Fall River,	Laborer,	"	–	House and 2 acres.
Julia Ann Crank,	22	"	Mulatto, (for.)	–	"	–	–
Mary Ann Crank,	5	Girl,	Fall River,	–	"	–	–
Rachel Crank,	4	"	"	–	"	–	–
Mark Anth. Howe Crank,	2	Boy,	"	–	"	–	–
Charles Austin Crank,†	–	"	"	–	"	–	–
Samuel Drummond,	22	Single,	"	Mariner,	New Bedford.	–	–
Fanny Drummond,	14	"	"	–	"	–	–
Henry Freeman,	–	–	"	–	Unknown.	–	–
William Gardner,	62	Married,	"	Laborer,	Swanzey.	–	–
Pamela Gardner,	60	"	"	–	"	–	–

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Hiram Gardner,	34	Single,	Fall River,	Laborer,	Swanzey.	–	–
Ann Elizabeth Gardner,	29	"	"	–	"	–	–
Sylvia Jane Gardner,	25	"	"	–	"	–	–
George H. Gardner,	23	"	"	Laborer,	"	–	–
Henry F. Gardner,	19	"	"	–	"	–	–
Charles Gardner,	17	"	"	–	"	–	–
Clara Gardner,	17	"	"	–	"	–	–
John Gardner,	10	Boy,	"	–	"	–	–
James Lindsay,	47	Married,	Colored, (for.)	Laborer,	Fall River.	–	–
Abigail Jane Lindsay,‡	47	"	Fall River,	–	"	–	–
Georgiana T. Lindsay,	14	Single,	"	–	"	–	–
Ebenezer H. Lindsay,	12	Boy,	"	–	"	–	–
Richard S. Lindsay,	7	"	"	–	"	–	–
Reuben Mason,	47	Married,	Colored, (for.)	Laborer,	"	–	–
Mahala (Page) Mason,	46	"	Fall River,	–	"	–	–
Barton Page,	23	Single,	"	Barber,	"	–	–
Charles Andrew Page,	20	"	"	–	"	–	–
William Page,	19	"	"	–	"	–	–
Zurviah Gould Mitchell,	52	Widow,	"	–	Abington,	–	House and 2 acres.
Doloris B. Mitchell,	24	Single,	"	–	"	–	–
Melinda Mitchell,	23	"	"	–	"	–	–
John B. Mitchell,	18	"	"	–	"	–	–
Lydia A. Mitchell,	15	"	"	–	"	–	–
Ann J. Mitchell,	12	Girl,	"	–	"	–	–
Charlotte L. Mitchell,	10	"	"	–	"	–	–
Alonzo H. Mitchell,	8	Boy,	"	–	"	–	–

* Sarah Crank and Thomas Crank make separate families, but are in the same house.

† Born January 8, 1860.

‡ Died August 17, 1860.

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FALL RIVER (OR TROY) INDIANS—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Cato Northup,	60	Married,	Colored, (for.)	Porter,	Providence.	–	–
Alice Northup,	58	"	Fall River,	–	"	–	–
Edward Northup,	31	Single,	"	–	"	–	–
James Northup,	28	"	"	–	"	–	–
Benjamin Northup,	26	"	"	–	"	–	–
Charles Northup,	25	"	"	–	"	–	–
Mercy Northup,	22	"	"	–	"	–	–
David Northup,	18	"	"	–	"	–	–
Hannah Perry,	71	Widow,	"	–	Reservation, Fall River,	–	House and 5 acres.
Josephus Perry,	31	Single,	–	–	" "	–	–
William Perry,	38	Married,	Fall River,	Indian Doctor,	" "	–	House and 5 acres.
Mary Perry,	26	"	Herring Pond,	–	" "	–	–
Clarissa Perry,	7	Girl,	Fall River,	–	" "	–	–
Phebe Perry,	4	"	"	–	" "	–	–
Maria Elizabeth Perry,	3	"	"	–	" "	–	–
Jesse Perry,	10 mo.	Boy,	"	–	" "	–	–
Catherine Perry,*		Girl,	"	–	" "	–	–
David Perry,	34	Single,	"	–	California.	–	–
Joseph C. Robinson,	–	Married,	Colored, (for.)	–	Abington.	–	–
Zurviah G. Robinson,	31	"	Fall River,	–	"	–	–
Lucretia Slade,	52	Single,	"	–	Unknown, supposed N. Bedford.	–	–
Sarah Slade,	46	"	"	–		–	–

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Lydia Saunders,†	46	Widow,	Fall River,	–	Swanzey.	–	–
Lewis Saunders,	24	Single,	"	–	"	–	–
Joseph Saunders,	18	"	"	–	"	–	–
Mary Frances Saunders,	16	"	"	–	"	–	–
Sarah W. Saunders,	14	"	"	–	"	–	–
Juliette Saunders,	12	"	"	–	"	–	–
Wm. Henry Saunders,	11	Boy,	"	–	"	–	–
Daniel Ward Saunders,	10	"	"	–	"	–	–
Charles Saunders,	8	"	"	–	"	–	–
Lucy Saunders,	4	Girl,	"	–	"	–	–
Stephen Terry,	51	–	"	–	Middleborough, (?)	–	–
Maria Terry,	53	–	–	–	"	–	–

HASSANAMISCO TRIBE.

Andrew C. Brown,	64	Married,	Hassanamisco,	Farmer,	Holden.	–	–
Eunice Brown,	58	"	White, (for.)	–	"	–	–
Eunice A. Brown,	38	Single,	Hassanamisco,	–	"	–	–
William Brown,	44	Married,	"	Barber,	Framingham.	–	–
Mary J. Brown,	44	"	Colored, (for.)	–	"	–	–
Charles W. Brown,	17	Boy,	Hassanamisco,	–	"	–	–
Edwin Brown,	10	"	"	–	"	–	–
Mary E. Brown,	5	"	"	–	"	–	–
Elizabeth Brown,	65	Widow,	"	–	"	–	–

* Born June 27, 1860.

† Mrs. Saunders was married some twenty-five years since, and soon after the birth of her first child, was deserted by her husband, and as he has never since been heard from, she is put down as a widow.

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HASSANAMISCO TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Elizabeth Brown,	**23**	**Single,**	**Hassanamisco,**	–	**Westborough.**	–	–
Adelaide E. Brown,	**2**	**Girl,**	"	–	"	–	–
William J. Brown,	**30**	**Married,**	**Colored, (for.)**	**Barber,**	**Shelburn Falls.**	–	–
Patience Fidelia Brown,	**29**	"	**Hassanamisco,**	–	"	–	–
Samuel Cisco,	49	"	Colored, (for.)	Farmer,	Grafton,	–	2½ acres, and a small house.
Sarah Maria Cisco,	40	"	Hassanamisco,	–	"	–	
James L. Cisco,	13	Boy,	"	–	"	–	–
William S. Cisco,	9	"	"	–	"	–	–
Samuel C. Cisco,	5	"	"	–	"	–	–
Lewis S. Cisco,	3	"	"	–	"	–	–
Sarah C. M. Cisco,	1½	Girl,	"	–	"	–	–
Elbridge Gigger,	47	Married,	"	Laborer,	South Gardner.	–	–
Livona Gigger,	48	"	Colored, (for.)	–	"	–	–
Levi F. Gigger,	21	Single,	Hassanamisco,	Laborer,	"	–	–
Elbridge G. Gigger,	11	Boy,	"	–	"	–	–
Eliza L. Gigger,	9	Girl,	"	–	"	–	–
Martha Ann Gigger,	4	"	"	–	"	–	–
Dexter Gigger,	**42**	**Married,**	"	Laborer,	Templeton.	–	–
Sarah L. Gigger,	**43**	"	**Colored, (for.)**	–	"	–	–
Rufus Hazard,*	**37**	"	**Narragansett, (?)**	–	**Uxbridge.**	–	–
Alithea Hazard,*	**44**	"	**Hassanamisco,**	–	**Oxford.**	–	–

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Samuel Hazard,	43	Widower,	Narragansett, (?)	–	Oxford.	–	–
William Wallace Hazard,	16	Boy,	Hassanamisco,	–	Insane Hospital.	–	–
John Hector,	67	Married,	"	Laborer,	Worcester,	–	House, house lot, and garden.
Susanna Hector,	60	"	Colored, (for.)	–	"	–	
Comelia A. Hector,	19	Single,	Hassanamisco,	–	"	–	–
Eliza Ophelia Arnold,	9	Girl,	"	–	"	–	–
J. Edward Hector,	42	Married,	"	Porter,	Boston.	–	–
Julia A. Hector,	45	"	Colored, (for.)	–	New York.	–	–
Richard A. Hector,	35	"	Hassanamisco,	Barber,	Worcester.	–	–
Ann Hector,	–	"	Mohegan,	–	"	–	–
Esther Elizabeth Hector,	13	Girl,	Hassanamisco,	–	"	–	–
Ida I. Abby Hector,	3	"	"	–	"	–	–
Fred'k Augustus Hector,*	1	Boy,	"	–	"	–	–
Moses C. Hector,†	29	Married,	"	Laborer,	"	–	–
Martha Hector,	32	"	–	–	"	–	–
Asa E. Hector,	23	"	Hassanamisco,	Shoemaker,	"	–	–
Lucretia Hector,	22	"	(Foreigner,)	–	"	–	–
George Frederick Hector,	2	Boy,	Hassanamisco,	–	"	–	–
Laura L. Hector,	5 mos.	Girl,	"	–	"	–	–
William H. Hector,	25	Married,	"	Laborer,	"	–	–
Lydia Jane Hector,	24	"	–	–	"	–	–
Henry B. Hemenway,	42	"	Colored, (for.)	Laborer,	South Gardner.	–	–
Elizabeth Hemenway,	40	"	Hassanamisco,	–	"	–	–
James H. Hemenway,	8	Boy,	"	–	"	–	–

* Living separate.

† Since deceased.

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HASSANAMISCO TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Gilbert Walker,	42	Married,	Colored, (for.)	Barber,	Worcester.	–	–
Sarah B. Walker,	41	"	Hassanamisco,	–	"	–	–
Sarah Ellen Walker,*	13	Girl,	Colored, (for.)	–	"	–	–
Sarah Wheeler,	–	Widow,	Hassanamisco,	–	Leicester.	–	–
Esther Stebbins,	–	Single,	"	–	"	–	–
Mary S. Stebbins,	–	Widow,	White, (for.)	–	Boston.	–	–
Caroline Stebbins,	29	Single,	Hassanamisco,	–	"	–	–
Daniel W. Stebbins,	28	"	"	–	"	–	–
Lewis Stebbins,	34	Married,	"	Baggage-master,	"	–	–
Emily S. Stebbins,	–	–	White, (for.)	–	–	–	–
John T. Howard,	–	Married,	White, (foreign.)	–	Dubuque, Iowa.	–	–
Catherine L. Howard,	31	"	Hassanamisco,	–	" "	–	–
Caroline Ellen Howard,	2	Girl,	"	–	" "	–	–
Josephine Howard,	Inf't	"	"	–	" "	–	–
Charles H. Murdock,	–	Married,	White, (foreign.)	–	–	–	–
Mary S. Murdock,	23	"	Hassanamisco.	–	–	–	–
Kate L. Murdock,	3	Girl,	"	–	–	–	–
Lewis Franklin Murdock,	1	Boy,	"	–	–	–	–
Ida E. Murdock,	Inf't	Girl,	"	–	–	–	–

* Adopted.

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SUPPLEMENTARY LIST.

Hannah Hemenway,	64	Single,	Hassanamisco,	–	Worcester.	–	–
Ebenezer Hemenway,	55	Married,	"	Laborer,	"	–	–
Elizabeth Hemenway,	56	"	Colored, (for.)	–	"	–	–
Hepsibah S. Hemenway,	29	Single,	Hassanamisco,	–	"	–	–
Alexander F. Hemenway,	25	Married,	"	Barber,	"	–	–
Emma A. Hemenway,	22	"	Punkapog,	–	"	–	–
Emma E. Hemenway,	2	Girl,	Hassanamisco,	–	"	–	–
Joseph J. Hemenway,	23	Married,	"	Fireman on locomotive,	"	–	–
Fanny A. Hemenway,	22	"	–	–	"	–	–
Ebenezer J. Hemenway,	3	Boy,	Hassanamisco,	–	"	–	–
James J. Johnson,	39	Married,	"	Barber,	"	–	–
Mary Ann Johnson,	37	"	Mixed, (foreign,)	–	"	–	–
James J. Johnson, Jr.,	10	Boy,	Hassanamisco,	–	"	–	–
Mary Ann Johnson,	9	Girl,	"	–	"	–	–
Hannah E. Johnson,	4	"	"	–	"	–	–
Joseph H. Johnson,	2	Boy,	"	–	"	–	–
Wm. Augustus Johnson,	1	"	"	–	"	–	–

DUDLEY INDIANS.

Josiah Bakeman,	27	Married,	Mixed, (foreign'r)	Porter,	Northampton.	–	–
Helen Bakeman,	23	"	Dudley,	–	"	–	–
Charles R. Bakeman,	2	Boy,	"	–	"	–	–

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DUDLEY INDIANS—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
James E. Belden,	43	Married,	Dudley,	Plumber,	Worcester.	–	–
Rebecca Belden,	–	"	Mixed, (foreign'r)	–	"	–	–
Joseph E. Belden,	22	Single,	Dudley,	–	"	–	–
Caroline M. Belden,	18	"	"	–	"	–	–
Ella Rebecca Belden,	6	Girl,	"	–	"	–	–
Charlotte G. E. Belden,	3	"	"	–	"	–	–
James H. Belden,	1½	Boy,	"	–	"	–	–
Francis A. Belden,	1½	"	"	–	"	–	–
Orrin Corbin,	39	Single,	"	Miner,	California.	–	–
Ruth Corbin,	35	"	"	–	Springfield.	–	–
Julia Daley,	51	Widow,	"	–	Oxford.	–	–
Anstis Daley,*	20	Single,	"	At service,	Webster.	–	–
Esbon Dorus,	45	Married,	New York,	Shoemaker,	Dudley.	–	–
Angenette B. **Dorus,**	29	"	Dudley,	–	"	–	–
Hezekiah Dorus,	14	Boy,	"	–	"	–	–
Henry L. Dorus,	12	"	"	–	"	–	–
Betsy Dorus,	10	Girl,	"	–	"	–	–
Cordelia Dorus,	7	"	"	–	"	–	–
Christina Dorus,	4	"	"	–	"	–	–
Matilda Dorus,	1	"	"	–	"	–	–
Luke Esau (alias Willard),	50	Married,	Colored, (for.)	Laborer,	Warren.	–	–
Eleanor Elizabeth Esau,	34	"	Dudley,	–	"	–	–
Elizabeth V. Esau,	17	Single,	"	–	"	–	–

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Albert Edwin Esau,	14	Boy,	Dudley,	—	State Reform School.	—	—	—	—	—	—
Alonzo Esau,	12	"	"	—	Warren.	—	—	—	—	—	—
Robert Esau,	7	"	"	—	"	—	—	—	—	—	—
Melancy Esau,	5	Girl,	"	—	"	—	—	—	—	—	—
Phebe Ann Esau,	3	"	"	—	"	—	—	—	—	—	—
Dorcas Delina Esau,	1	"	"	—	"	—	—	—	—	—	—
Theophilus D. Freeman,†	36	Married,	"	Barber,	Webster.	—	—	—	—	—	—
Mary Freeman,	32	"	Colored, (for.)	—	"	—	—	—	—	—	—
Hannah Isabella Williard,	12	Girl,	Dudley,	—	"	—	—	—	—	—	—
Thos. Jefferson Freeman,	30	Married,	"	Laborer,	South Gardner.	—	—	—	—	—	—
Esther Freeman,	24	"	Colored, (for.)	—	"	—	—	—	—	—	—
Harriet A. Freeman,	8	Girl,	Dudley,	—	"	—	—	—	—	—	—
Warren A. Freeman,	5	Boy,	"	—	"	—	—	—	—	—	—
Esther M. Freeman,	3	Girl,	"	—	"	—	—	—	—	—	—
Christina R. Freeman,	1	"	"	—	"	—	—	—	—	—	—
Lemuel Henry,	—	Married,	Colored, (for.)	Laborer,	Stockbridge.	—	—	—	—	—	—
Lydia A. Henry,	30	"	Dudley,	—	"	—	—	—	—	—	—
Matilda A. M. Nichols,	13	Girl,	"	—	"	—	—	—	—	—	—
Hannah Frances Nichols,	10	"	"	—	"	—	—	—	—	—	—
Emma T. G. Shelley,	8	"	"	—	"	—	—	—	—	—	—
William E. Shelley,	7	Boy,	"	—	"	—	—	—	—	—	—
Ida Angelia Shelley,	4	Girl,	"	—	"	—	—	—	—	—	—
Sarah S. Henry,	1	"	"	—	"	—	—	—	—	—	—
Henry Hull,	75	Married,	Colored, (for.)	Laborer,	Webster.	—	—	—	—	—	—
Matilda Hull,	66	"	Dudley,	—	"	—	—	—	—	—	—

* 1860. Since married to —— Anthony, (colored,) of Mendon.

† Removed to North Brookfield.

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DUDLEY INDIANS—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Esther Humphrey,*	85	Widow,	Dudley,	–	Spencer.	–	–
William Humphrey,	68	Married,	"	Laborer,	"	–	–
Elizabeth Humphrey,	66	"	Colored, (for.)	–	"	–	–
Mary Humphrey,	23	Single,	Dudley,	–	"	–	–
Aaron Humphrey,	61	Widower,	"	Laborer,	Eastford, Ct.	–	–
Luke Humphrey,	55	"	"	Laborer,	Unknown.	–	–
Cyrus Humphrey,	45	"	"	–	"	–	–
Jonas Humphrey,	–	"	"	–	"	–	–
Ira Humphrey,	–	Married,	"	–	"	–	–
Wife,	–	"	Colored, (for.)	–	"	–	–
Two children,	–	–	Dudley,	–	"	–	–
Hannah Humphrey,	34	Single,	"	–	Putnam, Ct.	–	–
Paris C. Jaha,	48	"	"	Blind,	Webster.	–	–
Mary Jaha,	44	"	"	–	"	–	–
Levi Jaha,	46	"	"	Laborer,	Spencer.	–	–
Rhoda Jaha,	42	Single,	"	–	Webster.	–	–
Martha A. Fiske,	25	"	"	–	"	–	–
William H. N. Cady,	17	Boy,	"	–	"	–	–
Joseph E. Beaumont,	12	"	"	–	"	–	–

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Sophia E. Kyle,	23	Widow,	Mixed, (for.)	–	Worcester.	– –
Helen E. Kyle,	2	Girl,	Dudley,	–	"	– –
Ida Estella Kyle,	1 mth.	"	"	–	"	– –
Edward Pegan,	70	Widower,	"	Laborer,	Webster.	– –
Betsy White,†	59	Widow,	"	–	"	– –
Joseph H. P. White,	28	Single,	"	Mariner,	"	– –
James M. Pegan,	37	Married,	"	Laborer,	Thompson, Ct.	– –
Hannah Pegan,	40	"	Natick,	–	"	– –
Edgar Pegan,	12	Boy,	Dudley,	–	"	– –
Middleton Pegan,	2	"	"	–	"	– –
James Pegan,	1	"	"	–	"	– –
Amey Robinson,§	56	Widow,	"	Indian Doctor,	Migratory.	– –
Patty Sprague,	80	Single,	"	–	Boston.	– –
Israel Sprague,†	26	Married,	"	Shoemaker,	Webster.	– –
Sally Maria Sprague,†	26	"	"	–	"	– –
Mary Ella Sprague,†	7	Girl,	"	–	"	– –
Angela Maria Sprague,†	1 mth.	"	"	–	"	– –
Mercy H. Oliver,‡	38	Widow,	"	–	Brookfield.	– –
Barzillai Willard,	39	Widower,	Colored, (for.)	Farmer,	Uxbridge.	– –
Paris Willard,	17	Boy,	Dudley,	–	"	– –
James Willard,	15	"	"	–	"	– –
Lydia Willard,	13	Girl,	"	–	"	– –
Isaac Davis Willard,	11	"	"	–	"	– –

* Died October, 12, 1860.

† 1860. Residing temporarily in Sturbridge.

‡ 1860. On reservation in Webster.

§ Alias Freeman.

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YARMOUTH TRIBE.

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Samuel Baker, Jr.,	45	Married,	White,	Laborer,	Yarmouth.	–	–
Sophronia Baker,	45	"	Yarmouth,	–	"	–	–
William Henry Baker,	18	Boy,	"	–	"	–	–
Thatcher Baker,	15	"	"	–	"	–	–
Martha E. Baker,*	12	Girl,	"	–	"	–	–
Susan H. Baker,	11	"	"	–	"	–	–
Alfred Baker,	8	Boy,	"	–	"	–	–
Louisa E. Baker,	5	Girl,	"	–	"	–	–
			"				
Nancy Brooks,	48	Widow,	"	–	"	–	75 acres at Marshpee.
John Brooks,	25	Single,	"	Mariner,	"	–	–
Mary A. Brooks,	22	"	"	–	"	–	–
Sylvester Brooks,	20	"	"	–	"	–	–
Deborah J. Cash,	41	Widow,	"	–	"	–	–
Charles Edward Cash,	18	Boy,	"	Mariner,	"	–	–
Barzillai Cash,†	17	"	"	"	"	–	–
Leander Cash,	15	"	"	–	"	–	–
Lucy Ellen Cash,	13	Girl,	"	–	"	–	–
Eliza Ann Cash,	11	"	"	–	"	–	–
George Henry Cash,	9	Boy,	"	–	"	–	–
Geo. Washington Chase,	40	Married,	White,	Mariner,	"	–	–
Nancy J. Chase,	38	"	Yarmouth,	–	"	–	–
George W. Chase,	19	Single,	"	Mariner,	"	–	–
Franklin H. Chase,	17	Boy,	"	–	"	–	–
Nancy Jane Chase,	15	Girl,	"	–	"	–	–

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YARMOUTH TRIBE.

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Samuel Baker, Jr.,	45	Married,	White,	Laborer,	Yarmouth.	–	–
Sophronia Baker,	45	"	Yarmouth,	–	"	–	–
William Henry Baker,	18	Boy,	"	–	"	–	–
Thatcher Baker,	15	"	"	–	"	–	–
Martha E. Baker,*	12	Girl,	"	–	"	–	–
Susan H. Baker,	11	"	"	–	"	–	–
Alfred Baker,	8	Boy,	"	–	"	–	–
Louisa E. Baker,	5	Girl,	"	–	"	–	–
			"				
Nancy Brooks,	48	Widow,	"	–	"	–	75 acres at Marshpee.
John Brooks,	25	Single,	"	Mariner,	"	–	–
Mary A. Brooks,	22	"	"	–	"	–	–
Sylvester Brooks,	20	"	"	–	"	–	–
Deborah J. Cash,	41	Widow,	"	–	"	–	–
Charles Edward Cash,	18	Boy,	"	Mariner,	"	–	–
Barzillai Cash,†	17	"	"	"	"	–	–
Leander Cash,	15	"	"	–	"	–	–
Lucy Ellen Cash,	13	Girl,	"	–	"	–	–
Eliza Ann Cash,	11	"	"	–	"	–	–
George Henry Cash,	9	Boy,	"	–	"	–	–
Geo. Washington Chase,	40	Married,	White,	Mariner,	"	–	–
Nancy J. Chase,	38	"	Yarmouth,	–	"	–	–
George W. Chase,	19	Single,	"	Mariner,	"	–	–
Franklin H. Chase,	17	Boy,	"	–	"	–	–
Nancy Jane Chase,	15	Girl,	"	–	"	–	–

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Betsy N. Chase,	12	Girl,	Yarmouth,	—		Yarmouth.	—	—	—	—	—	—
Mary Ann Chase,	10	"	"	—		"	—	—	—	—	—	—
Timothy T. Chase,	8	Boy,	"	—		"	—	—	—	—	—	—
Lucy W. Chase,	5	Girl,	"	—		"	—	—	—	—	—	—
Luella Augusta Chase,	6 mos.	"	"	—		"	—	—	—	—	—	—
Allen Cobb,	44	Married,	White,	Mariner,		"	—	—	—	—	—	—
Sally Cobb,	42	"	Yarmouth,	—		"	—	—	—	—	—	—
Henry Allen Cobb,	11	Boy,	"	—		"	—	—	—	—	—	—
Andrew F. Cobb,	8	"	"	—		"	—	—	—	—	—	—
Sarah Eliza Cobb,	3	Girl,	"	—		"	—	—	—	—	—	—
Samuel Cobb,	—	Married,	White,	Mariner,		Barnstable.	—	—	—	—	—	—
Polly Cobb,‡	36	"	Yarmouth,	—		"	—	—	—	—	—	—
Edward Cobb,	16	Boy,	"	—		"	—	—	—	—	—	—
Mary Caroline Cobb,	15	Girl,	"	—		"	—	—	—	—	—	—
John Blackford Cobb,	12	Boy,	"	—		"	—	—	—	—	—	—
Emily Taylor Cobb,	10	Girl,	"	—		"	—	—	—	—	—	—
Eliza Cobb,	8	"	"	—		"	—	—	—	—	—	—
Susan Taylor Cobb,	7	"	"	—		"	—	—	—	—	—	—
Deborah Jane Cobb,	3	"	"	—		"	—	—	—	—	—	—
William Cook,	35	Married,	White,	Mariner,		Yarmouth.	—	—	—	—	—	—
Susanna Cook,	39	"	Yarmouth,	—		"	—	—	—	—	—	—
James B. Cook,	7	Boy,	"	—		"	—	—	—	—	—	—
Levi R. Cook,	5	"	"	—		"	—	—	—	—	—	—
Thomas Greenough,	14	"	"	—		"	—	—	—	—	—	—
Charles G. Cook, Jr.,	21	Married,	White,	Mariner,		"	—	—	—	—	—	—
Abby M. Cook,	18	"	Yarmouth,	—		"	—	—	—	—	—	—

* Died April 10, 1860.

† Lost overboard at sea, October, 1859.

‡ Since died.

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YARMOUTH TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Joseph Crocker,	25	Married,	White,	Mariner,	Barnstable.	–	–
Emily Crocker,	25	"	Yarmouth,	–	"	–	–
Wm. W. Crocker,	4	Boy,	"	–	"	–	–
Joseph Crocker,	1½	"	"	–	"	–	–
Asa Crocker,	25	Married,	White,	Mariner,	"	–	–
Jane F. Crocker,	21	"	Yarmouth,	–	"	–	–
Benjamin F. Crocker,	2	Boy,	"	–	"	–	–
Matthias Craig,	–	Married,	White,	Laborer,	Roxbury.	–	–
Betsy Craig,	23	"	Yarmouth,	–	"	–	–
Infant,	–	Girl,	"	–	"	–	–
Sally Greenough,	70	Single,	"	–	Yarmouth.	–	–
James W. Holloway,	25	Married,	White,	Laborer,	East Sandwich.	–	–
Susan J. Holloway,	29	"	Yarmouth,	–	"	–	–
Josephine Holloway,	5	Girl,	"	–	"	–	–
Ella J. Holloway,	3	"	"	–	"	–	–
Willard W. Holloway,	4 mos.	Boy,	"	–	"	–	–
Francis Haskell,*	43	Married,	White,	–	–	–	–
Sophia Haskell,	48	"	Yarmouth,	–	Barnstable.	–	–
Sophia A. Baker,†	15	Girl,	"	–	"	–	–
Ezra C. Baker,†	12	Boy,	"	–	"	–	–
Russell N. Baker,†	9	"	"	–	"	–	–

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Simeon Nickerson,	45	Married,	Yarmouth,	Mariner,	Yarmouth.	—	—	—	—	—	—
Melinda Nickerson,	—	"	White,	—	"						
Edwin Nickerson,	15	Boy,	Yarmouth,	—	"						
Elizabeth R. Nickerson,	10	Girl,	"	—	"						
Adda Nickerson,	8	"	"	—	"						
David Nickerson,	6	Boy,	"	—	"						
Martha T. Nickerson,	2	Girl,	"	—	"						
David Nickerson,	39	Married,	Yarmouth,	Mariner,	Barnstable.	—	—	—	—	—	—
Mary Ann Nickerson,	—	"	Irish,	—	"						
Mary Jane Nickerson,	11	Girl,	Yarmouth,	—	"						
Elizabeth E. Nickerson,	8	"	"	—	"						
Emma Nickerson,	6	"	"	—	"						
Georgiana Nickerson,	3	"	"	—	"						
Thomas B. Nickerson,	38	Married,	"	Mariner,	East Sandwich.	—	—	—	—	—	—
Amelia Nickerson,	26	"	Irish,	—	"						
Celina Nickerson,	7	Girl,	Yarmouth,	—	"						
Joseph F. Nickerson,	5	Boy,	"	—	"						
Robert M. Nickerson,	3	"	"	—	"						
Daniel H. Nickerson,	2	"	"	—	"						
William Nickerson,‡	—	Married,	White,	—	Yarmouth.	—	—	—	—	—	—
Susanna Nickerson,‡	59	"	Yarmouth,	—	Barnstable.	—	—	—	—	—	—
Frederick E. Nickerson,§	33	Married,	"	—	Wareham.	—	—	—	—	—	—
Isabella Nickerson,§	21	"	Herring Pond,	—	"	—	—	—	—	—	—
Ella B. Nickerson,§	1	Girl,	Yarmouth,	—	"	—	—	—	—	—	—

* Separated from his wife.

† Children of Sophia, by Ezra Baker, (white,) her first husband.

‡ Living separate.

§ Considered as belonging to Herring Pond Tribe.

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YARMOUTH TRIBE—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Joseph F. Nickerson,	24	Married,	Yarmouth,	–	Wareham.	–	–
Emeline A. Nickerson,	18	"	–	–	"	–	–
Levi Rogers,	26	Married,	White,	Mariner,	Orleans.	–	–
Deborah F. Rogers,	38	"	Yarmouth,	–	"	–	–
John G. Rogers,	13	Boy,	"	–	"	–	–
Heman S. Rogers,	4	"	"	–	"	–	–
James Smith,	24	Married,	White,	Mariner,	Yarmouth.	–	–
Juliana Smith,	42	"	Yarmouth,	–	"	–	–
Nancy J. Ellis,*	20	Single,	"	–	"	–	–
Warren H. Ellis,	17	Boy,	"	–	"	–	–
Frederick N. Ellis,	15	"	"	–	"	–	–
Anthony M. Ellis,	9	"	"	–	"	–	–
William Taylor,	57	Married,	Light mulatto,	Mariner,	Barnstable.	–	–
Desire M. Taylor,	45	"	Yarmouth,	–	"	–	–
Thomas Taylor,	24	Single,	"	Mariner,	"	–	–
Susan Taylor,	21	"	"	–	"	–	–
William Albert Taylor,	15	Boy,	"	–	"	–	–
Julia Taylor,	12	Girl,	"	–	"	–	–
Charlotte Taylor,	12	"	"	–	"	–	–
John Taylor,	9	Boy,	"	–	"	–	–
Francis Taylor,	27	Married,	"	Mariner,	"	–	–
Margaret Taylor,	–	"	Irish,	–	"	–	–
Thomas Taylor,	6	Boy,	Yarmouth,	–	"	–	–

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John Taylor, . } Twins. {	5	Boy, . .	Yarmouth, . .	–		Barnstable. . .	–	–
Francis Taylor, } {	5	" . .	" . .	–		" . .	–	–
Timothy Taylor, . .	–	Married, .	White, . .	Mariner, . .		Yarmouth. . .	–	–
Elizabeth Taylor, . .	34	" .	Yarmouth, . .	–		" . .	–	–
George F. Cash,† . .	10	Boy, . .	" . .	–		" . .	–	–
Orrin F. Cash,† . .	9	" . .	" . .	–		" . .	–	–
—— Taylor, . . .	3	–	" . .	–		" . .	–	–
—— Taylor, . . .	1	–	" . .	–		" . .	–	–

DARTMOUTH INDIANS.

Oliver C. Boston, . .	22	Single, .	Dartmouth, .	Mariner, . .	Westport. . .	–	–
Thomas S. Boston, . .	21	" .	" . .	Daguerreotypist,	" . .	–	–
Deborah Boyden, . .	50	Widow, .	" . .	–	Dartmouth. . .	–	–
Nathaniel A. Boyden, .	22	Single, .	" . .	Trader, . .	" . .	–	–
Charles William Boyden,	21	" .	" . .	–	" . .	–	–
Joseph W. Boyden, . .	16	Boy, . .	" . .	–	" . .	–	–
Thomas Cole, . . .	29	Married, .	" . .	–	Providence. . .	–	–
Jerusha Ann Cole, . .	25	" .	Unknown, . .	–	" . .	–	–
Alice Cook, . . .	68	Widow, .	Dartmouth, .	–	Westport, . .	–	12 acres.
Benjamin P. Cook, . .	35	Single, .	" . .	Farmer, . .	" . .	–	15 acres.
Eliza A. Crouch, . .	52	Widow, .	" . .	–	" . .	–	–
Mary S. Crouch, . .	19	Single, .	" . .	–	" . .	–	–
Ruth A. Crouch, . .	16	" . .	" . .	–	" . .	–	–
Elizabeth N. Crouch, .	12	Girl, . .	" . .	–	" . .	–	–

* Children of Juliana, by Ziba Ellis, (white,) her first husband.

† Children of Elizabeth, by Ensign Cash, (white,) her first husband.

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DARTMOUTH INDIANS—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Catherine Charles,	9	Girl,	Dartmouth,	–	Boston.	–	–
Samuel Cuffe,	59	Married,	"	–	Westport,	–	40 acres.
Harriet Cuffe,	56	"	"	–	"	–	–
Lucy J. Cuffe,	22	Single,	"	–	"	–	–
Samuel R. Cuffe,	15	Boy,	"	–	"	–	–
John H. Cuffe,	9	"	"	–	"	–	–
Charles H. Cuffe,	3	"	"	–	"	–	–
Elizabeth Cuffe,	59	Widow,	"	–	New Bedford.	–	–
William Cuffe,	21	Single,	"	–	"	–	–
Hannah Q. Cutler,	48	Widow,	"	–	Stoughton.	–	–
Caroline E. Cutler,	19	Single,	"	–	New Bedford.	–	–
Benjamin F. Cutler,	17	"	"	–	"	–	–
John P. Cutler,	28	Married,	"	–	New York.	–	–
Mrs. Cutler,	–	"	"	–	"	–	–
Child,	–	–	"	–	"	–	–
Silas Dick,	35	Single,	"	Mariner,	Dartmouth.	–	–
Sarah Rosier,	50	Widow,	"	–	"	–	–
Edward Fairweather,	39	Married,	(Foreigner,)	Laborer,	New Bedford.	–	–
Joanna L. Fairweather,	32	"	Dartmouth,	–	"	–	–
Francis Jones,	39	Married,	Colored, (for.)	–	Fairhaven.	–	–
Freelove S. Jones,	37	"	Dartmouth,	–	"	–	–

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Freelove S. Jones, Jr.,	15	Single,	Dartmouth,	—	Fairhaven.	—	—	
William F. Jones,	14	Boy,	"	—	"	—	—	
Thomas H. Jones,	11	"	"	—	"	—	—	
William Knobb,	73	Married,	Colored, (for.)	—	Rochester.	—	—	
Mary Knobb,	74	"	Dartmouth,	—	"	—	—	
James M. Lang,	35	"	"	—	Dartmouth.	—	—	
Sarah Ann Lang,	33	"	Colored, (for.)	—	"	—	—	
Joseph Lang,	16	Boy,	Dartmouth,	—	"	—	—	
Ellen Lang,	12	Girl,	"	—	"	—	—	
Amelia Lewis,	24	Single,	"	—	Westport.	—	—	
John Marston,	75	Widower,	"	Farmer,	"	—	—	35 acres land, with buildings.
Jeremiah W. Marston,	50	Single,	"	"	"	—	—	
Mary Jane Marston,	32	"	"	—	"	—	—	
Henry Miller,	31	Married,	Colored, (for.)	Mariner,	Dartmouth.	—	—	
Louisa J. Miller,	24	"	Dartmouth,	—	"	—	—	
Phebe Ann Miller,	3	Girl,	"	—	"	—	—	
Joseph Nicholson,	35	Married,	Colored, (for.)	—	Westport.	—	—	
Catherine A. Nicholson,	32	"	Dartmouth,		"	—	—	
Pardon C. Nicholson,	3	Boy,	"	—	"	—	—	
Elizabeth C. Nicholson,	1	Girl,	"	—	"	—	—	
Edward R. Phelps,	39	Married,	"	—	Westport.*	—	—	
Adelina Phelps,	—	"	Colored, (for.)	—	"	—	—	
Isabella Phelps,	8	Girl,	Dartmouth,	—	"	—	—	
Edward R. Phelps, Jr.,	4	Boy,	"	—	"	—	—	

* Transiently at Victoria, Vancouver.

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DARTMOUTH INDIANS—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Marshall L. Potts,	59	Married,	Colored, (for.)	–	New Bedford.	–	–
Cynthia Potts,	52	"	Dartmouth,	–	"	–	–
Martha J. Potts,	11	Girl,	"	–	"	–	–
Sarah Smith,	58	Widow,	"	–	"	–	–
Thomas Smith,	47	Married,	"	–	Dartmouth.	–	–
Charlotte Smith,	53	"	"	–	"	–	–
John T. Talbot,	30	"	Indian,	–	Stoughton.	–	–
Martha Ann Talbot,	27	"	Dartmouth,	–	"	–	–
Cecilia Frances Talbot,	5	Girl,	"	–	"	–	–
Amelia A. Talbot,	1	"	"	–	"	–	–
John M. Taylor,	61	Married,	Colored, (for.)	–	Westport,	–	1 acre, and house.
Rhoda Ann Taylor,	63	"	Dartmouth,	–	"	–	–
Sarah Thompson,	55	Widow,	"	–	New Bedford.	–	–
Adelaide Thompson,	12	Girl,	"	–	"	–	–
Samuel Irving Tilghman,	38	Married,	–	–	"	–	–
Eliza Ann Tilghman,	42	"	Dartmouth,	–	"	–	–
Charles F. Tilghman,	18	Boy,	"	–	"	–	–
Walter S. Tilghman,	16	"	"	–	"	–	–
Mary E. Tilghman,	12	Girl,	"	–	"	–	–
Hiram Tilghman,	10	Boy,	"	–	"	–	–
Lauriette Tilghman,	4	Girl,	"	–	"	–	–
Eugene P. Tilghman,	1	Boy,	"	–	"	–	–

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John H. Vincent,	20	Single,	Dartmouth,	Mariner.		–	–	–	–
Chloe Wainer,	80	Widow,	"	–		Westport,	–		32 acres.
Ira W. Wainer,	50	Single,	"	Imbecile,		"	–		–
Adoneram L. Wainer,	44	"	"	Farmer,		"	–		–
John Wainer,	77	Married,	"	Farmer,		Westport,	–		50 acres.
Mary Wainer,	64	"	Colored, (for.)	–		"	–		–
William W. Wainer,	36	Single,	Dartmouth,	Ship keeper,		New Bedford.	–		–
Sylvanus E. Wainer,	30	"	"	Miner,		Australia.	–		–
Sarah Ann Wainer,	28	"	"	–		Westport.	–		–
Rodney Wainer,	52	"	"	Farmer,		"	–		30 acres.
Jeremiah Wainer,	50	Married,	"	"		"	–		–
Mary Jane Wainer,	–	"	Fall River,	–		"	–		–
Eliza K. Wainer,	20	Single,	Dartmouth,	–		"	–		–
Albert Wainer,	13	Boy,	"	–		"	–		–
Louisa Wainer,	7	Girl,	"	–		"	–		–
Asa F. Wainer,	46	Married,	"	–		"	–		–
Mary J. Wainer,	40	"	"	–		"	–		–
Amelia J. Wainer,	18	Single,	"	–		"	–		–
Paul F. Wainer,	16	Boy,	"	–		"	–		–
Chloe D. Wainer,	14	Girl,	"	–		"	–		–
Ann C. Wainer,	13	"	"	–		"	–		–
Alexander S. Wainer,	5	Boy,	"	–		"	–		–
Emeline F. Wainer,	3	Girl,	"	–		"	–		–
Maria E. Wainer,	6 mos.	"	"	–		"	–		–
James P. Wainer,	44	Single,	"	Laborer,		"	–		–

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DARTMOUTH INDIANS—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Samuel Douglas,	28	Married,	Colored, (for.)	–	New Bedford.	–	–
Abby C. Douglas,	27	"	Dartmouth,	–	"	–	–
Peter Fowler,	45	Married,	Halifax,	–	"	–	–
Mary A. Fowler,	29	"	Dartmouth,	–	"	–	–
Walter A. Fowler,	10	Boy,	"	–	"	–	–
Charlotte White,	84	–	"	Indian Doctor,	–	–	11 acres.

SUPPLEMENTARY LIST.

[These are not included in the aggregates.]

Alexander Howard,	50	Married,	Dartmouth,	–	California.	–	–
Rebecca Howard,	44	"	–	–	"	–	–
Shadrack Howard,	38	"	Dartmouth,	Sailmaker,	San Francisco.	–	–
Helen L. Howard,	35	"	–	–	"	–	–
Cordelia Howard,	16	Single,	Dartmouth,	–	"	–	–
Martha A. Howard,	15	"	"	–	"	–	–
Horatio Howard,	5	Boy,	"	–	"	–	–
Elijah F. Howard,	30	Single,	"	–	–	–	–

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David F. Wainer,	34	Married,	Dartmouth,	—	—	—	—	—	—	—	—
Lydia Ann Wainer,	31	"	"	—	—	—	—	—	—	—	—
George T. Wainer,	7	Boy,	"	—	—	—	—	—	—	—	—
Frederick D. Wainer,	6	"	"	—	—	—	—	—	—	—	—
Lucy L. S. Wainer,	3	Girl,	"	—	—	—	—	—	—	—	—
Charles S. Wainer,	3 mos.	Boy,	"	—	—	—	—	—	—	—	—
Gardner Wainer,	—	—	"	—	—	—	Syracuse, N. Y.	—	—	—	—
Mrs. Wainer,	—	—	—	—	—	—	—	—	—	—	—
3 children,	—	—	—	—	—	—	—	—	—	—	—
Michael Wainer,	—	—	Dartmouth,	—	—	—	Stockbridge, Oneida County, New York.	—	—	—	—
Mrs. Wainer,	—	—	—	—	—	—		—	—	—	—
7 children,	—	—	—	—	—	—		—	—	—	—

MAMATTAKEESET INDIANS.

Joseph Hyatt,	54	Married,	Mamattakeeset,	—	Laborer,	—	Pembroke.	—	—	—	—
Abigail Hyatt,	50	"	Marshpee,	—	—	—	"	—	—	—	—
Isaiah Hyatt,	18	Boy,	Mamattakeeset,	—	—	—	"	—	—	—	—
William Hyatt,	16	"	"	—	—	—	"	—	—	—	—
Susan J. Hyatt,	13	Girl,	"	—	—	—	"	—	—	—	—
Henry C. Hyatt,	11	Boy,	"	—	—	—	"	—	—	—	—
Warren Hyatt,	3	"	"	—	—	—	"	—	—	—	—
Jane Hyatt,	71	Single,	"	—	—	—	"	—	—	—	—
William Joel,	58	"	"	—	Pauper,	—	"	—	—	—	—

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MAMATTAKEESET INDIANS—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Martin Prince,	59	Married,	Mamattakeeset,	Laborer,	Pembroke.	–	–
Esther Prince,	53	"	"	–	"	–	–
Charles Prince,	29	Single,	"	Shoemaker,	"	–	–
Eliza Prince,	28	"	"	–	"	–	–
Augustus Prince,	23	"	"	Shoemaker,	"	–	–
Mary Prince,	15	"	"	–	"	–	–
Almira Prince,	9	Girl,	"	–	"	–	–
Mary Emma Prince,	4	"	"	–	"	–	–
Joshua Prince,	32	Married,	"	Shoemaker,	East Abington.	–	–
Lucy J. Prince,	–	"	Indian,	–	" "	–	–
William Edwin Prince,	5	Boy,	Mamattakeeset,	–	" "	–	–
Harriet Maria Prince,	4	Girl,	"	–	" "	–	–
Elizabeth Prince,*	1	"	"	–	" "	–	–
Augustus Prince,	23	Married,	"	Shoemaker,	South Scituate.	–	–
Eliza M. N. Prince,	–	"	"	–	" "	–	–
Frederick N. Prince,†	2	Boy,	"	–	" "	–	–

TUMPUM TRIBE.

Abigail Christopher,	75	Widow,	Indian,	–	Fall River.	–	–
Elizabeth Christopher,	32	Single,	"	–	"	–	–

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David Fuller, , . .	71	Widower,	Indian, . .	–	Pembroke. . .	–	–
Mary Jane Fuller, . .	16	Single, .	" . .	–	Mattapoisett. . .	–	–
David Fuller, Jr., . .	39	Married, .	" . .	–	Salem. . . .	–	–
Salome Fuller, . .	25	" .	Colored, . .	–	" . . .	–	–
David Fuller, . . .	10	Boy, . .	Indian, . .	–	" . . .	–	–
Charles Fuller, . .	8	" . .	" . .	–	" . . .	–	–
Franklin Fuller, . .	3	" . .	" . .	–	" . . .	–	–
Alice Fuller, . . .	1	Girl, . .	" . .	–	" . . .	–	–
Thomas G. T. Fuller,‡ .	29	Married, .	" . .	–	Lynn. . . .	–	–
Caroline A. Fuller, . .	38	" .	" . .	–	" . . .	–	–
Sarah Jane Fuller, . .	5	Girl, . .	" . .	–	" . . .	–	–
Martha Jane Fuller, .	5	" . .	" . .	–	" . . .	–	–
Alice Fuller, . . .	3	" . .	" . .	–	" . . .	–	–

DEEP BOTTOM INDIANS.

Isaac Easton, . . .	61	Married, .	Narragansett, .	Farmer, . .	Deep Bottom. .	–	–
Jemima Easton, . .	67	" .	Deep Bottom, .	–	" . .	–	–
Tristram Freeman, . .	36	Married, .	Chappequiddick,	–	" . .	–	–
Priscilla Freeman, . .	47	" .	Deep Bottom, .	–	" . .	–	–
John Jackson, . . .	9	Boy, . .	" .	–	" . .	–	–
David Freeman, . .	4	" . .	" .	–	" . .	–	–
Frank H. Freeman, .	2	" . .	" .	–	" . .	–	–

* Since deceased.

† Another child, a daughter, born in 1860.

‡ I am informed, that although this name is rightly given, yet he is not generally known by the name of "Thomas," that he writes his name Gideon T., and is known by the name of Gideon T. or Gideon Tumpum.

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DEEP BOTTOM INDIANS—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Abiah Harris,	44	Widow,	Deep Bottom,	–	New Bedford,	–	–
James W. Harris,	20	Single,	"	–	"	–	–
Fanny Harris,	13	"	"	–	"	–	–
Lucy Turner,	36	"	"	–	Temporarily in California.	–	–
William H. Saunders,	42	Married,	"	Mariner,	Deep Bottom.	–	–
Almira Saunders,	33	"	Christiantown,	–	"	–	–

MISCELLANEOUS.

Charles Gigger,*	65	Married,	Indian,	Laborer,	Greenfield.	–	–
Mrs. Gigger,	46	"	–	–	"	–	–
Daniel Gigger,	59	"	Indian,	Laborer,	Barre.	–	–
Sophrona Gigger,	49	"	Black,	–	"	–	–
Albert Gigger,	19	Boy,	Indian,	–	"	–	–
Augusta Gigger,	15	Girl,	"	–	"	–	–
Amanda Gigger,	12	"	"	–	"	–	–
Walter Gigger,	10	Boy,	"	–	"	–	–
Sarah Gigger,	69	Widow,	–	–	Boston.	–	–
Keziah Gigger,	18	Single,	Indian,	–	"	–	–

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Benjamin F. Gigger,	46	Widower,	Indian,	Cook,	Boston,	—	—
Alice Gigger,	18	Single,	"	—	"	—	—
William Gigger,	16	Boy,	"	—	"	—	—
Albert Gigger,	12	"	"	—	"	—	—
Charles Gigger,	33	Married,	"	Laborer,	Barre.	—	—
Susan Gigger,	21	"	Colored,	—	"	—	—
Josiah Gigger,	21	"	Indian,	Laborer,	"	—	—
Mary Gigger,	27	"	Colored,	—	"	—	—
William Nutter,	45	"	"	—	—	—	—
Sarah Nutter,	36	"	Indian.	—	—	—	—
Mary Vickers,† about	60	Widow,	"	—	Uxbridge.	—	—
Rufus Vickers,	34	Married,	"	—	Oxford.	—	—
Fanny Vickers,	25	"	"	—	"	—	—
Cordelia Vickers,	5	Girl,	"	—	"	—	—
Emma Elizabeth Vickers,	3	"	"	—	"	—	—
Diana (Hazard) Smith,	39	Widow,	"	—	"	—	—
Eugene M. Smith,	12	Boy,	"	—	"	—	—
Augustus Smith,	11	"	"	—	"	—	—
Charles Miller,	56	Married,	"	Laborer,	Taunton.	—	—
Lucretia Miller,	58	"	"	—	"	—	—
William Warner,	—	—	—	—	New Bedford.	—	—
Mary Warner, about	75	—	Indian,	—	"	—	—

* This name is pronounced Jigger.

† Since removed to Oxford.

MISCELLANEOUS—*Continued.*

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Peter Fields,	48	Married,	Colored,	Laborer,	Worcester.	–	–
Philena Fields,	47	"	Indian,	–	"	–	–
Philena L. Fields,	19	Single,	"	–	"	–	–
Israel G. Fields,	17	Boy,	"	–	"	–	–
Hannah M. Fields,	15	Girl,	"	–	"	–	–
John E. H. Fields,	13	Boy,	"	–	"	–	–
Emily R. Fields,	11	Girl,	"	–	"	–	–
Mary Morey,	43	Divorced,	"	–	Lynn.	–	–
John Morey, Jr.,	25	Married,	"	Barber,	Worcester.	–	–
—— Morey,	–	"	–	–	"	–	–
Dandridge Thomas,	49	"	Indian,	Laborer,	Needham.	–	–
Caroline Thomas,	–	"	–	–	"	–	–
Frederick Thomas,	23	Single,	Indian,	Laborer,	"	–	–
Benjamin Thomas,	22	"	"	–	"	–	–
John Thomas,	19	"	"	–	"	–	–
Charles Thomas,	17	Boy,	"	–	"	–	–
Sarah Thomas,	16	Girl,	"	–	"	–	–
Samuel Thomas,	13	Boy,	"	–	"	–	–
Harriet Thomas,	11	Girl,	"	–	"	–	–
Nathaniel Thomas,	7	Boy,	"	–	"	–	–
Albert Thomas,	5	"	"	–	"	–	–
George Thomas,	25	Married,	"	Barber,	Roxbury.	–	–
Adeline Thomas,	21	"	–	–	"	–	–

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Lucina Thomas,	5	Girl,	Indian,	–	Roxbury.	–	–
Lester Thomas,	3	Boy,	"	–	"	–	–
Frederick Thomas,	1	"	"	–	"	–	–
Eli Burr,*	48	Married,	Oneida,	–	Holland.	–	–
Saloma Burr,	53	"	"	–	"	–	–
Vianna Burr,	24	Single,	"	–	Springfield.	–	–
Fidelia Burr,	19	"	"	–	"	–	–
Alonzo Burr,	17	"	"	–	Holland.	–	–
Samantha Burr,	16	"	"	–	"	–	–
Albert Burr,	10	"	–	–	"	–	–
Abram Jackson,†	29	Married,	–	Shoemaker,	West Brookfield.	–	–
Martha Jackson,	27	"	Oneida,	–	"	–	–
Laura Electa Jackson,	7	Girl,	"	–	"	–	–
Mary Jane Jackson,	5	"	"	–	"	–	–
Mary Burr,	21	Single,	"	–	"	–	–

* Mr. Burr's grandfather was an Oneida chief.

† Since removed to Sturbridge.

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RECAPITULATION.

TRIBE.	Families.	Males.	Females.	Unknown.	Under 5 years of age.	From 5 to 10 yrs. of age.	From 10 to 21 yrs. of age.	From 21 to 50 yrs. of age.	From 50 to 70 yrs. of age.	Of 70 years of age and over.	Age unknown.	Natives.	Foreigners.	Total.
Chappequiddick,	17	36	38	–	2	7	15	39	8	3	–	67	7	74
Christiantown,	14	23	30	–	7	5	10	24	5	2	–	53	–	53
Gay Head,	54	128	125	–	19	29	77	84	29	7	8	237	16	253
Marshpee,	93	186	216	1	50	44	97	146	46	20	–	371	32	403
Herring Pond,	19	31	36	–	9	5	12	32	8	1	–	62	5	67
Natick,	2	7	5	–	1	1	5	4	1	–	–	10	2	12
Punkapog,	31	53	64	–	16	11	23	52	13	2	–	101	16	117
Fall River,	16	41	37	–	8	5	21	32	8	3	1	72	6	78
Hassanamisco,	26	41	49	–	18	7	9	46	9	1	–	70	20	90
Dudley,	19	42	50	2	17	9	18	35	9	4	2	83	11	94
Aggregate of the Plantation Tribes,	291	588	650	3	147	123	277	494	136	43	11	1,126	115	1,241
Yarmouth,	23	66	57	3	17	24	36	45	3	1	–	105	21	126
Dartmouth,	29	58	53	–	10	7	25	44	19	6	–	99	12	111
Mamattakeeset,	5	13	12	–	5	2	5	7	5	1	–	24	1	25
Tumpum,	4	6	9	–	4	2	2	5	–	2	–	14	1	15
Deep Bottom,	4	7	6	–	2	1	2	6	2	–	–	13	–	13
Middleborough,	4	3	7	–	–	–	2	7	1	–	–	10	–	10
Miscellaneous,	18	34	35	–	3	6	20	28	8	2	2	57	12	69
Aggregate,	378	775	829	6	188	165	379	636	174	55	13	1,448	162	1,610

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B.

The letter from the Committee, containing the propositions on page 64, is as follows:—

MARSHPEE, Aug. 27, 1859.

To Hon. JOHN MILTON EARLE,

In compliance with a duty assigned us, at your meeting at Marshpee, we make the following report of our deliberations:

1. *Voted*, to recommend to your Honor to intercede for us to have a law passed giving us the right to nominate our Treasurer.
2. *Voted*, to recommend to your Honor to intercede for us for an addition to our School Fund, to raise it from $325 to $400.
3. *Voted*, to recommend to your Honor to intercede for us to have the right to send a delegate to the Legislature.

All of which we submit to your kind consideration.

SOLOMON ATTAQUIN,
PETER S. FOLLER,
MOSES POCKNET,
SAMPSON E. ALVIS,
G. T. SEWIL,
Committee to consider the wants of Marshpee.

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C.

PETITION OF THE TROY INDIANS.

To the Honorable JOHN MILTON EARLE, *Commissioner:*

DEAR SIR,—The undersigned persons of the Tribe of "Troy Indians" residing on the Indian Lands in Fall River would most respectfully ask you to present and recommend our petition to the General Court. We have a tract of land, containing about two hundred acres, and the same was divided, set off, and assigned to the several families of the tribe, about one hundred years ago. Since that time some of those families have become extinct, others have abandoned the lands entirely, and some have claimed rights to the land, whose title thereto, we think, is doubtful, and we respectfully pray the General Court to cause a division to be made of the whole tract, to each family or individual, who may be found entitled thereto, in such manner as will enable each to have his part in severalty, and that each may have a portion of land lying on one of the public roads, running through their lands, and also a lot of the wood land; and that the same may be set off, and bounded, so that each one may occupy his own separately,

And, as in duty bound, will ever pray.

HANNAH PERRY.
SARAH CRANK.
WILLIAM PERRY.
HENRY CRANK.

Indian Town, Fall River, August 15, 1859.

[The record of the survey, renewal of the bounds, and reassignment of the lots of the Fall River Plantation as approved by the General Court, in 1764, is as follows:]

I the subscriber, being appointed by ye Hon^{l} Committe of ye Genl Court to Renew ye bounds, survey, subdivide and plan the 185 Acres of Land, which I make by survey to be 190 Acres & 64 Rods Granted by ye General Court to Capt James Church & Company, Ind. and have subdivid'd ye same into twenty-eight Equeal parts and erected sutable

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bounds at ye corners of each divisional part or lott. Fore of said parts is layed out in one lott at ye north-west corner, next to ye Pond, for ye Hears or Legual Representatives of Capt. James Church, like wise marked on ye plan, each lott ye place of ye house that stands thereon on those lotts where there is any, & ye names of ye indians that lives in them, and have set forth on each of ye lots what improvement are made, & by whom made, and how long they have improved them. Each of ye aforesaid eaqual parts contains 6 acres and 128 Rods.

The Boundaries of this aforesaid land is as followeth. Bounding West North West, upon Wattuppa Ponds & southwardly on ye land that ye Boouths now owns, Begining at ye middle of a flat rock, which is in ye edg of s^d^ pond, south-west from a large white oak tree, Between s^d^ rock and another rock near to said white oak, and northwardly of s^d^ tree extending E. S. E. 2 Degrees S. 104 rods by a range of marked trees to a stump with a stake by it, an old anchent Bound mark, with a heap of stones around ye same, And likewise from thence 60 rods to a gray oak tree, full mark, and so on by a range of marked trees 148 rods unto a ridged hill to an old white oak tree full mark, and from said white oak 69 rods to a stake with a large heap of stones about ye same which is ye south-east corner bound of ye aforesaid land, which maketh the South line from ye Pond to this head bound to be 381 rods, and from said south-east corner Bound, giving ye point of compass on ye head of said land, which appears to be on ye Head line of the Freeman's Purches of ye township of Freewn, North 30 degrees E. 71 rods & about 12 feet, to a small gray oak tree marked on three sides with a large heap of stones about ye sam, which is ye north-east corner bound of ye abovesaid land, which maketh said land to be 77 rods wide, and from said north-east corner bound running W. N. W. 2 degrees N. By a range of marked treas, down to said Wattuppa Pond, To a scrub Black oak tree, full mark, which stands by ye edg of s^d^ Pond with a heap of stones about ye same, which fully appears to be ye northwest corner Bound of ye land abovesaid.

I humbly submit myself as in duty bound.

ZEBEDEE TERRY.

A Schedule of the lotts of the Indians' land and to whom they severally belong, lying in Freetown, in the County of Bristol.

The first lott containing Twenty-seven acres and thirty-two rods belongs to the heirs and legall Representatives of Capt. James Church, who died Aprill 1739 leaving two sons James & Isaac, and five daughters, Mary, Experience, Marcy, Mary & Phebe. Mary is alive, having one child, a daughter named Experience, who has five children.

Marcy is alive, having two children.

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Mary the second is alive & no children.

Phebe is alive and has eight children.

James is dead, leaving two children George & Katharine, George aged 25 years & Katharine aged 22 years.

Isaac died, leaving seven children, viz.: Isaac aged 23 years, Comfort aged 22 years, Phebe aged 16 years, Constant 14 years, *non compos mentis*, Martha aged 9 years, Mary aged 7 years and Solomon aged 6 years.

The second lott contains 6 Acres & 128 rods, originally laid out to Tom Pim, who died without children and has left three cousins, Isaac Church, Mercy Hope, and Experience Ward.

The third lott contains 6 Acres & 128 Rods, and belongs to Hannah Mouse & Elizth Penny, Grandchildren of Jonathan George.

The fourth lot contains 6 acres & 128 Rods, originally laid out to Samuel Church who is dead and hath left no posterity.

The fifth lot contains 6 acres & 128 rods, originally laid out to James Wilcox, who is dead and hath left no posterity.

The sixth lot contains 6 acres & 128 rods, originally laid out to old Nebe, who has left two Granddaughters, Elizabeth and Nebe.

The seventh lot contains 6 acres & 128 rods, originally laid out to young James Church. Belongs to his heirs George and Katy.

The eighth lott contains 6 acres & 128 Rods, originally laid out to Job Cockaway, who has left a daughter Abigaill Titicutt, and a granddaughter Betty Cockaway.

The ninth lott contains 6 acres & 128 Rods, originally laid out to young Sam^{ll} Church, who has left no posterity.

The tenth lott contains 6 acres & 128 Rods, originally laid out to Joshua Quam, who has left a widdo Sarah Quam, and one daughter Hope Penny a widdo.

The eleventh lott contains 6 acres & 128 Rods originally laid out to James Church Junr and has left a widdo.

The twelfth lott contains 6 acres & 128 Rods, originally laid out to old John Wood, who has left one grand son named Samuell.

The thirteenth lott contains 6 acres & 128 Rods, originally laid out to Simon Smith, alias Slade, who has left no posterity.

The fourteenth lott contains 6 acres & 128 Rods, originally laid out to David Rice, who has left no posterity.

The fifteenth lott contains 6 acres & 128 Rods, originally laid out to Joseph Husband, and belongs to Richard Grandson to his sister Sarah Doggett.

The sixteenth lott contains 6 acres & 128 Rods, originally laid out to Joshua Church, who has left no posterity.

The seventeenth lott contains 6 acres & 128 rods originally laid out to Saml Anthony, and belongs to Ellis Anthony & Sarah Titticutt widdows.

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The eighteenth lott contains 6 acres & 128 rods, originally laid out to John Yokine, who left one daughter Hannah married to Sias Hall.

The nineteenth lot contains 6 acres & 128 rods, originally laid out to old Job Weshuc, who has left no posterity.

The twentieth lott contains 6 acres & 128 rods, originally laid out to Isaac Sissell, who left two daughters, Mercy and Mary.

The twentieth-first lott contains 6 Acres & 128 rods, originally laid out to James Cook, who has left no posterity.

The twenty-second lott contains 6 acres & 128 rods, originally laid out to Tom Hunter, who has left no posterity.

The twenty-third lott contains 6 acres and 128 rods, originally laid out to Sam^{ll} Titticutt, who has left a widdo and one daughter Hannah Cooper.

The twenty-fourth lott contains 6 acres & 128 Rods, originally laid out to John Sochomoich, who has left one son named John, and two granddaughters, Mary & Mercy.

The twenty-fifth lott contains 6 acres & 128 rods, originally laid out to James Demas & has left a granddaughter named Lydia.

And whereas sundry of the Soldiers, belonging to the company under Capt. James Church, have left no posterity, and there being no provision made for Lieut. Manchester and twelve others in the same company the Committee have agreeable to the directions of the Court assigned to those who have left posterity the lotts of those who had lotts assigned to them, and whose posterity is extinct.

We assign to the fourth lott Deborah & Experience, the daughters of Lieut Robin Manchester.

We assign to the fifth lott Joseph and William, grandchildren of Lieut Manchester and sons of Willm Manchester.

We assign to the ninth lott Nancy Pelick, daughter of Francis Townsend.

We assign to the thirteenth lott Sarah, grandchild of John Sosamon.

We assign the fourteenth lott to Peter and Charles, grandchildren to Peter Washunk.

We assign the sixteenth lott to Deborah & Penelope, granddaughters of Peter Washunk.

We assign to the nineteenth lott Esther Sampson, Sarah Squire, Grandchildren of Benj^{a} Squinnamay.

We assign the twenty-first lott to Sarah Quam's two children, Daniell & James.

We assign to the twenty-second lott to Comfort and Thankfull, Grandchildren of Benj^{a} Squinnamay.

W. Brattle, by order.

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In Council, Feby 3d 1764. Read & accepted & Ordered that the lands aforementioned be & hereby are confirmed to the several persons agreeable to ye report of said Committee.

Sent down for Concurrence.

JOHN COTTON *D. Sec'y.*

In the House of Rep^ts^ Feby 3d, 1764.

Read & Concurred.

TIMO RUGGLES, *Spk^r^.*

Consented to.

FRA. BERNARD.

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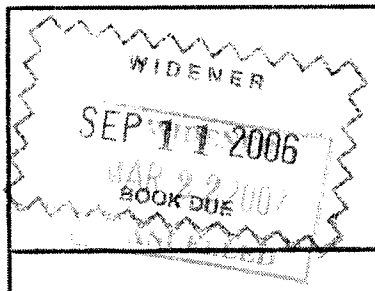

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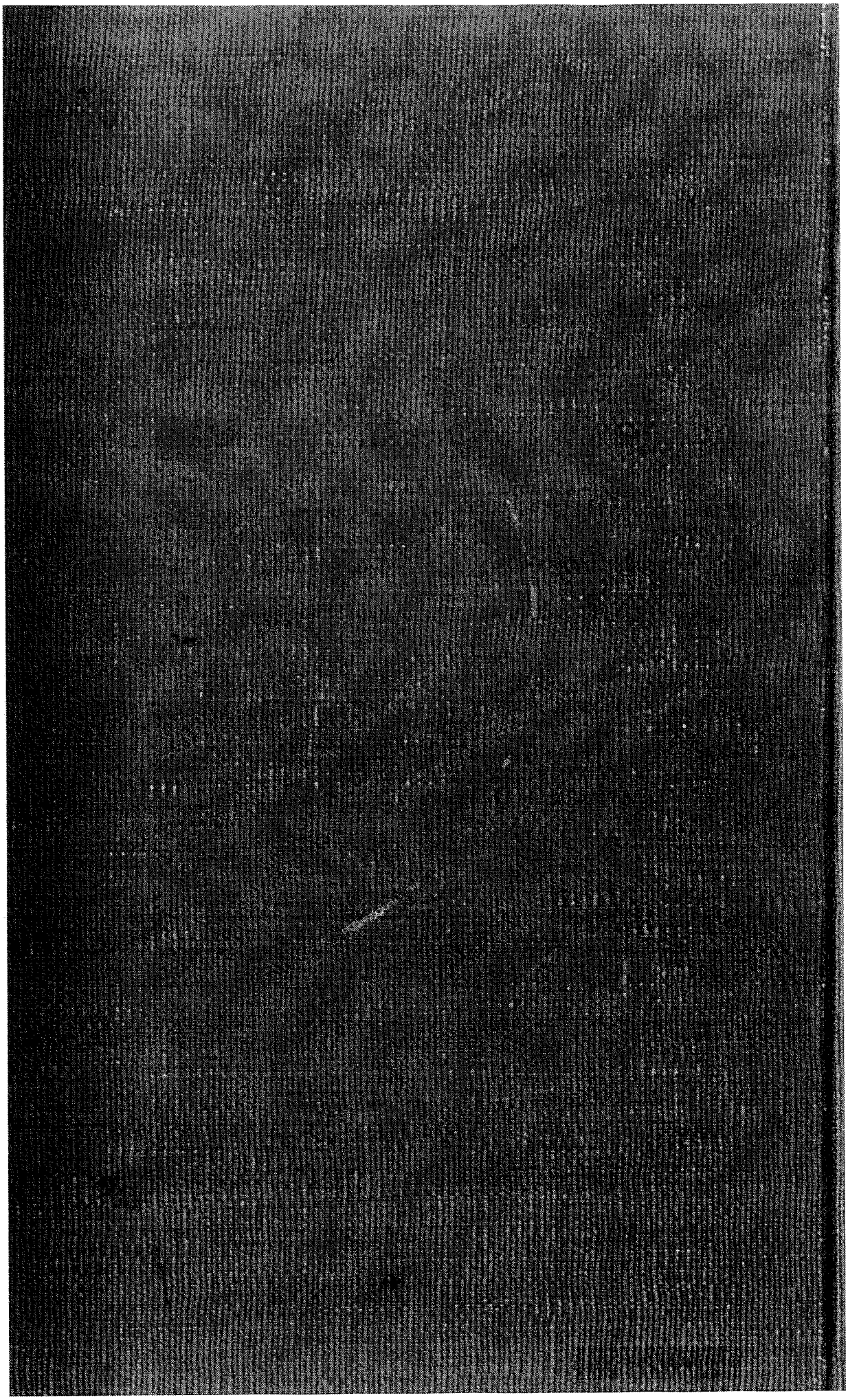

The 1860 Indian Census of Gay Head (Aquinnah), Mass.

[From the transcript *Indians of Massachusetts: GAY HEAD TRIBE* in Mass. Senate No. 96 publication, March 1861.]
[Digitized and prepared for the web by C. Baer, 1999]

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Mehitable Ames	80	Widow	Gay Head	-	Gay Head	-	3 acres.
John Anthony	44	Married	Portuguese (for.)	Mariner	"	1 horse, 1 swine	-
Mary C. Anthony	45	"	Gay Head	-	"	-	6 acres.
Rachel B. Anthony	15	Single	"	-	"	-	-
Joseph S. Anthony	11	Boy	"	-	"	-	-
Leander Bassett	50	Married	Edgartown	Farmer	"	5 cattle	5 acres.
Huldah Bassett	52	"	Gay Head	-	"	-	-
Julia Bassett	21	Single	"	-	"	-	-
Moses Bassett	15	Boy	"	-	"	-	-
Esther Bassett	12	Girl	"	-	"	-	-
Bethiah Bassett	11	"	-	-	"	-	-
George J. Belain,*	49	Married	Chappequiddick	Mariner and farmer	"	7 cattle, 2 horses	12 acres.
Sophia Belain	43	"	Gay Head	-	"	-	-
Betsy Belain	16	Single	"	-	"	-	-
Peter Belain	12	Boy	"	-	"	-	-
Joseph Belain	11	"	"	-	"	-	-
Alonzo Belain	9	"	"	-	"	-	-
Daniel Belain	5	"	"	-	"	-	-
William Belain	31	Married	Chapequiddick	Mariner	"	-	-
Laura Ann Belain	21	"	Gay Head	-	"	-	-
Frederick Belain	4 mos.	Boy	"	-	"	-	-
Priscilla Bowes,**	26	Single	"	-	"	-	-
James Bowyer	45	Married	Colored, (for'er,)	Farmer	Gay Head	2 cattle	4 acres.
	48	"	Gay Head	-	"	-	-

Mehitable Bowyer							
Alexander Brown	86	Widower	Colored, (for'er,)	Pauper	"	-	-
Patience Cole	77	Widow	Gay Head	-	"	-	-
Andrew John Cole	16	Boy	"	-	"	-	-
Tirzah R. Cole	11	Girl	"	-	"	-	-
Thaddeus W. Cook,***	36	Married	"	Mariner	"	3 cattle, 2 swine	8 ½ acres.
Emily G. Cook	29	"	"	-	"	-	-
Christina Cook	6	Girl	"	-	"	-	-
Jothannes Salisbury	33	Single	"	Mariner	"	-	3 acres.
Hannah Cooper	68	Widow	"	-	Chilmark		10 acres.
George W. Cooper	41	Married	"	Mariner and Farmer	Gay Head	1 cow	4 acres.
Sarah M. Cooper	24	"	Marshpee	-	"	-	-
Susan Cooper	3	Girl	Gay Head	-	"	-	-
Aaron Cooper,****	39	Married	"	Farmer	"	5 cattle, 4 horses and 2 swine	12 acres.
Phebe Cooper	27	"	Marshpee	-	"	-	-
Georgiana Cooper	10	Girl	Gay Head	-	"	-	-
Nancy A. Cooper	8	Girl	"	-	"	-	-
Aaron Cooper, Jr.	2	Boy	"	-	"	-	-
Thomas Cooper	50	Single	"	Pauper, blind	"	-	-
Abiah Cooper	59	Widow	"	-	"	1 cow	2 acres.
Belinda Cooper,*****	20	Single	"	-	"	-	-

* Another son, John W. born in October, 1859.
** Since married to John Williams, colored, (foreigner.) laborer of West Tisbury, aged about 40.
*** Another daughter, Ida, born about March, 1860.
**** Another daughter, Alice, born about January, 1860.
***** Andrew Cooper, son of Belinda, born February, 1860.

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Zaccheus Cooper	35	Married	Gay Head	Farmer	Gay Head		10 acres.

						4 cattle, 1 horse, and 1 swine	
Martha R. Cooper	34	"	Marshpee	-	"	-	-
Rhoda Frances Cooper	9	Girl	Gay Head	-	"	-	-
Abraham F. Cooper	7	Boy	"	-	"	-	-
Susannah T. Cooper	5	Girl	"	-	"	-	-
Landon Corsa	46	Married	Colored, (for'er,)	-	Has run away	-	-
Julia Corsa	46	"	Gay Head	-	Gay Head	-	½ acre.
Abby A. Corsa	18	Single	"	-	"	-	-
Coombs Corsa	15	Boy	"	-	"	-	-
Levi Cuff	40	Single	"	Mariner	"	1 cow	2 acres.
Paul Cuff	37	"	"	"	"	-	2 acres.
George David,*	51	Married	"	Farmer	"	5 cattle, 1 horse, and 3 swine	15 acres.
Louisa David	47	"	Marshpee	-	"	-	-
Alexander David	16	Boy	Gay Head	-	"	-	-
Prudence David	11	Girl	"	-	"	-	-
Patrick Devine	49	Married	"	Farmer	"	5 neat cattle, 1 horse & 1 swine	9 acres.
Louisa Devine	33	"	Marshpee	-	"	-	-
Mercy A. Devine	11	Girl	Gay Head	-	"	-	-
Hannah C. Devine	9	"	"	-	"	-	-
Simon J. Devine	2	Boy	"	-	"	-	-
Grafton E. Devine	2 mos.	"	"	-	"	-	-
Patrick L. Devine	5	"	"	-	"	-	-
Betsy Dodge	70	Single	Gay Head	-	Gay Head	-	}2 acres.
Caroline Dodge	65	"	"	-	"	-	}
John Devine,*	46	Widower	"	Farmer	"	4 cattle, horse, & 1 swine	15 acres.
John Devine, Jr.	23	Single	"	Mariner	"	-	-
Avis A. Devine,**	19	"	"	-	"	-	-
Abiah T. Devine	12	Girl	"	-	"	-	-
Parnel B. Devine	6	Boy	"	-	"	-	-
James Diamond	36	Married	Indian (foreign.)	Uncertain	Gone to parts unknown.	-	-
Abiah Diamond	38	"	Gay Head	-	Gay Head	-	4 acres.
Jane Cook,***	19	Single	"	-	"	-	-

Lewis Cook,***	10	Boy	"	-	"	-	-
William Harrison Cook,***	7	"	"	-	"	-	-
Forstena Cook,***	6	Girl	"	-	"	-	-
Maria I. Cook,***	4	"	"	-	"	-	-
Rachel Diamond	1	"	"	-	"	-	-
Phillip Dodge	45	Single	"	Mariner	"	-	-
Jonathan Francis	61	Married	"	Farmer	"	2 pigs	
Mary Ann Francis	56	"	Christiantown	-	"	-	
Samuel Haskins	28	Single	Gay Head	Mariner	"	-	
Zaccheus Howwoswee	57	Married	"	Farmer	"	8 cattle, horse, colt, and 2 swine	34 acres.
Elizabeth Howwoswee	49	"	"	-	"	-	-
Esther Howwoswee	63	Single	"	-	"	-	7 acres.

* Since deceased.
** Avis A. Devine is since married to William S. James of Christiantown.
*** Children of Abiah Diamond, by Lewis Cook her first husband.

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
William Holmes	19	Single	Gay Head	Servant	New York	-	-
Amos Jeffers	75	Married	Marshpee	Farmer	Gay Head	1 cow, 1 horse	-
Lydia Jeffers	42	Single	Gay Head	-	"	-	½ acre.
William Jeffers	51	Married	Christiantown	Mariner	"	5 cattle	4 acres.
Eliza C. Jeffers	25	"	Gay Head	-	"	-	-
Mary C. Jeffers,*	17	Single	"	-	"	-	-
Hepzibah J. Jeffers	10	Girl	"	-	"	-	-
Lydia Johnson Jeffers	7	"	"	-	"	-	-
Isaac Newton Jeffers	2 ½	Boy	"	-	"	-	-
James Jeffers	25	Married	"	Mariner	"	-	-
Mellissa Jeffers	23	"	"	-	"	-	-
Elzada Jeffers	2	Girl	"	-	"	-	-
Thomas Jeffers	33	Married	Gay Head	Mariner	Gay Head	1 cow	7 acres.
Lucina Jeffers	24	"	"	-	"	-	-
Thomas C. Jeffers	5	Boy	"	-	"	-	-
Cordelia Jeffers	3	Girl	"	-	"	-	-
Amos Jeffers	1 ½	Boy	"	-	"	-	-
Josiah Jerard	61	Married		Mariner		-	-

			Sandwich, (for.)		Insane Hospital, Taunton		
Olive Jerard	60	"	Gay Head	-	Gay Head	-	1 acre.
Josiah Jerard, Jr.	16	Boy	"	-	"	-	-
Jane Mingo,**	28	Single	"	-	"	-	-
Charles Mingo,**	22	"	"	-	"	-	-
Joel Jerard	33	Married	Gay Head	Mariner	Gay Head	1 cow, 1 horse	3 acres.
Rosannah Jerard	20	"	"	-	"	-	-
Abraham Jerard***	35	Single	"	Mariner	"	-	-
Simon Johnson	65	"	"	Farmer	"	1 cow, 1 horse	30 acres.
Simon Johnson, 2d	33	"	"	Mariner	"	-	10 acres.
Prince Johnson	57	Married	"	"	Chilmark	-	-
Elizabeth Johnson	48	"	"	-	"	-	-
Peter Johnson	20	Single	"	-	"	-	-
Jonathan F. Johnson	19	"	"	-	"	-	-
Algernon S. Johnson	18	Boy	"	-	"	-	-
Sarah F. Johnson	17	Girl	"	-	"	-	-
Julia Johnson	14	"	"	-	"	-	-
Methia H. Johnson	11	"	"	-	"	-	-
William Prince Johnson	8	Boy	"	-	"	-	-
Diana Madison	51	Widow	"	-	Gay Head	6 cattle, 1 swine	16 acres.
Anna J. Madison	23	Single	"	-	"	-	-
Charlotte Madison	19	"	"	-	"	-	-
Charles B. Madison	17	Boy	"	Mariner	"	-	-
Isaac Madison	14	"	"	-	"	-	-
Raymond Madison	1	"	"	-	"	-	-
Thomas Manning	45	Married	"	Farmer	"	3 cattle, 2 swine	8 acres.
Rosabelle Manning,****	27	"	"	-	"	-	-
Isabella Manning	3	Girl	"	-	"	-	-
Thomas E. Manning	1	Boy	"	-	"	-	-

* A son born of Mary C. Jeffers, February, 1860.
** Jane and Charles Mingo are children of Olive Jerard, by her first husband.
*** Abraham is Joel's brother.
**** Another daughter, Rebecca I. Manning, born in May, 1860.

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Alvan Manning,*	43	Married	Gay Head	Farmer	Gay Head	2 swine	12 acres.
Daniel Nevers	43	Single	"	Mariner	"	-	3 acres.
Absalom Nevers	36	Married	"	"	"	-	-
Louisa Nevers	31	"	"	-	"	-	-
Ann E. Nevers	15	Single	"	-	"	-	-
Alexander Nevers	9	Boy	"	-	"	-	-
Johnson Peters	76	Married	Chappequiddick	Farmer	"	7 cattle, 2 horses, 2 swine	14 acres.
Mary Peters	76	"	Gay Head	-	"	-	-
Betsy Peters	47	Single	"	-	"	-	-
Mary Cuff	15	"	"	-	"	-	-
Samuel Peters	50	Married		Farmer		4 cattle, 1 horse, 1 swine	8 acres.
Sarah A. Peters,**	49	"	"	-	"	-	-
Samuel Peters, Jr.	19	Single	"	-	"	-	-
Jesse P. Peters	16	Boy	"	-	"	-	-
Johnson Peters, 2d	14	"	"	-	"	-	-
Joseph Peters	8	"	"	-	"	-	-
Francis Peters	7	"	"	-	"	-	-
John P. Randolph	47	Married	Haytian, (for.)	Laborer	"	-	-
Serena C. Randolph	39	"	Gay Head	-	"	-	4 acres.
Margaret P. Randolph	11	Girl	"	-	"	-	-
Robert Morton	13	Boy	"	-	"	-	-
Abraham Rodman	51	Married	Narragansett	Carpenter	Gay Head	12 cattle, 1 horse, 4 swine	25 acres.
Charlotte M. Rodman,***	45	"	Gay Head	-	"		-
Mary Jane Rodman	18	Single	"	-	"		2 acres.
Benjamin Rodman	15	Boy	"	-	"		-
Caleb Rodman	13	"	"	-	"		-
Elizabeth Rodman	9	Girl	"	-	"		-
Isaac D. Rose,****	47	Married	Fall River	Farmer	"	-	12 acres.
Harriet A. Rose	38	"	Gay Head	-	"	-	-
Alfred P. Rose	11	Boy	"	-	"	-	-
Mincolo C. B. Rose	6	Girl	"	-	"	-	-
Francis Sylvia	51	Married		Mariner		-	-

			Portuguese, (for.)		Gone to parts unknown		
Eleanor Sylvia	40	"	Gay Head	-	Gay Head	-	16 acres.
James Sylvia	12	Boy	"	-	"	-	-
Eleanora P. Sylvia	8	Girl	"	-	"	-	-
Maria Sewell	59	Single	"	Pauper	"	-	-
William Shepherd	66	Married	Colored, (for'ner)	Mariner	Went to sea many yrs. since	-	-
Clara Shepherd	53	"	Gay Head	-	Lun. Hos. Taunton, (Inc'ble	-	-
Mary Ann Shepherd	16	Single	"	-	-	-	-
Joseph Stevens	50	"	"	Mariner	Gay Head	-	-
John Terry***	22	"	"	"	"	-	-
John Thompson,	33	Married	"	"	"	-	-
Hannah P. Thompson,	24	"	Marshpee	-	-	-	-

* Separated from his wife, who, with her son, are on the Marshpee list.
** Sarah A. Peters is since deceased.
*** Since deceased.
**** Another daughter, Harriet S., born about March, 1860.

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty
William A. Vanderhoop	44	Married	Col. (for.) from Surinam	Barber, now farmer	Gay Head	4 cattle, 1 swine	20 acres.
Beulah Vanderhoop	45	"	Gay Head	-	"	-	-
Louisa E. Vanderhoop	21	Single	"	-	"	-	-
Wm. A. Vanderhoop, Jr.	19	"	"	-	"	-	-
Paulina A. Vanderhoop	17	"	"	-	"	-	-
John P. Vanderhoop	15	Boy	"	-	"	-	-
Anna E. Vanderhoop	13	Girl	"	-	"	-	-
Edwin D. Vanderhoop	11	Boy	"	-	"	-	-
	9	Girl	"	-	"	-	-

Nannette C. Vanderhoop							
Cummings B. Vanderhoop	6	Boy	"	-	"	-	-
Leonard L. Vanderhoop	4	"	"	-	"	-	-
Hebron Walmsley	39	Married	"	Carpenter	"	-	5 acres.
Eleanor Walmsley	38	"	"	-	"	-	-
Celestine Walmsley	19	Single	"	-	"	-	-
Tolman Walmsley	18	Boy	"	-	"	-	-
Amey Walmsley	15	Girl	"	-	"	-	-
Lavinia Walmsley	12	Girl	"	-	"	-	-
Hebron Walmsley, Jr.	10	Boy	"	-	"	-	-
Valentine Walmsley	2	"	"	-	"	-	-
Jane Walmsley	60	Widow	"	-	"	3 cattle	7 acres.
Tristram Weeks	59	Married	"	Farmer	"	4 cattle, 3 horses, 3 swine	12 acres.
Tamezen Weeks	54	"	"	-	"	-	-
Elizabeth Weeks	14	Girl	"	-	"	-	-
Tristram Weeks, Jr.	10	Boy	"	-	"	-	-
Triphosa Thomas,*	19	Single	Gay Head	-	Gay Head	1 cow	2 acres.
Thomas Green Cooper,**	22	"	"	Mariner	"	-	-
John Williams	61	Married	Colored, (for.)	Boatman	"	-	-
Sophronia Williams	56	"	Gay Head	-	"	1 swine	10 acres.

* Daughter of Tamezen Weeks by first husband.
** Brother of Tamezen Weeks.

SUPPLEMENTARY LIST

NAME.	Age.	Sex or Condition.	Tribe or Race.	Occupation.	Residence.	Stock.	Land in severalty.
Bathsheba Aucouch	47	-	Gay Head	-	New Bedford.	-	-
Daniel Deming	45	Married	Colored, (for.)	Bricklayer	-	-	-
Mary A. Deming	42	"	Gay Head	-	-	-	-
Mary S. Deming	17	Single	"	-	-	-	-
Charles W. Deming	16	Boy	"	-	-	-	-

Alice J. Deming	14	Girl	"	-	-	-	-
Daniel Deming, Jr.	12	Boy	"	-	-	-	-
Dyer W. Deming	9	"	"	-	-	-	-
Angeline C. Deming	6	Girl	"	-	-	-	-
Catherine Francis	35	Single	"	-	Chilmark	-	10 acres in Chilmark.
Jemima Francis	13	Girl	"	-	"	-	-
Olive Francis	13	"	"	-	"	-	-
Daniel W. Francis	7	Boy	"	-	"	-	-
Eugene Francis	5	"	"	-	"	-	-
James E. Henry	33	Married	Colored, (for.)	Mariner	New Bedford	-	-
Jane E. Henry	37	"	Gay Head	-	"	-	-
Mary Almy Henry	15	Girl	"	-	"	-	-

SUPLEMENTARY LIST-Continued.

NAME.	Age.	Sex or Condition.	Tribe or Race	Occupation	Residence	Stock.	Land in severalty
James E. Henry, Jr.	13	Boy	Gay Head	-	New Bedford.	-	-
William Henry	11	"	"	-	"	-	-
Ranzaretta Henry	7	Girl	"	-	"	-	-
William Haskins	42	Married	"	Master mariner	"	-	-
Elizabeth P. Haskins	33	"	Colored, (for.)	-	"	-	-
Margaret K. Haskins	14	Girl	Gay Head	-	"	-	-
Hannah Haskins	11	"	"	-	"	-	-
Caroline W. Haskins	10	"	"	-	"	-	-
Mary L. E. Haskins	5	"	"	-	"	-	-
Elizabeth R. Haskins	1 ½	"	"	-	"	-	-
Peter Howard	33	Married	Colored, (for.)	-	"	-	-
Almira Howard	32	"	Gay Head	-	"	-	-
Elizabeth Howard	3	Girl	"	-	"	-	-
Laura Howard	1	"	"	-	"	-	-
Anthony G. Jordan	47	Married	Colored, (for.)	-	"	-	-
Hepzibah C. Jordan	47	"	Gay Head	-	"	-	-
Anthony G. Jordan, Jr.	21	Single	"	-	"	-	-
John P. Jordan	19	"	"	-	"	-	-

Julius L. Jordan	17	Boy	"	-	"	-	-
Lydia C. Jordan	15	Girl	"	-	"	-	-
Charles B. Jordan	11	Boy	"	-	"	-	-
William P. Powell	-	Married	Colored, (for.)	-	-	-	-
Mercy O. Powell	47	"	Gay Head	-	-	-	-
William P. Powell, Jr.	25	Single	"	-	-	-	-
Edward Powell	-	"	"	-	-	-	-
Sylvester Powell	-	Boy	"	-	-	-	-
Isaiah Powell	-	"	"	-	-	-	-
Mercy Powell	-	Girl	"	-	-	-	-
Samuel Powell	-	Boy	"	-	-	-	-
Sarah Powell	-	Girl	"	-	-	-	-
Catherine Ockray	-	-	-	-	New Bedford.	-	-
Amelia Lewis	24	Single	Gay Head	-	Westport.	-	-

Comments? Corrections? Suggestions? Contact C. Baer.
Questions about Gay Head / Aquinnah / Wampanoag genealogy? Contact June Manning <lthslnks@gis.net>.

Return to Dukes County History.

INDIANS, MISSIONARIES AND RELIGIOUS TRANSLATIONS: CREATING WAMPANOAG CHRISTIANITY IN SEVENTEETH-CENTURY MARTHA'S VINEYARD

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WILLIAMSBURG, VIRGINIA

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Indians, Missionaries, and Religious Translation: Creating Wampanoag Christianity in Seventeenth-Century Martha's Vineyard

David J. Silverman

> Then I thought, if I prayed to God in our Language, whether could God understand my prayers in our Language; therefore I did ask Mr. *Jackson*, and Mr. *Mahu*, If God understood prayers in our Language? They answered me God doth understand all Languages in the World.
> —Conversion narrative of Waban, a praying Indian of Natick, 1653

JOHN Cotton Jr.'s maiden voyage to Martha's Vineyard in 1665 must have been a time of soul-searching and low expectations. Two years earlier this Harvard-educated son of a Puritan divine was run out of the Wethersfield, Connecticut, pastorate for sexual indiscretion and a sharp tongue. To rehabilitate his name, Cotton had to perform good Christian service and behave himself, so when the opportunity arose to replace the recently deceased Thomas Mayhew Jr. as preacher to the colonists of Martha's Vineyard and missionary to the island's Wampanoags, he reluctantly accepted the position. One imagines Cotton sailing toward this destination, eyes fixed on the shrinking mainland shoreline, reflecting on his fall from an elite family, college, and ministry, to become a poorly compensated missionary on a remote

David J. Silverman teaches history at The George Washington University. He wishes to thank audiences who commented on earlier versions of this article at the New England Seminar of the American Antiquarian Society, a brownbag colloquium held by George Washington University's history department, and a colloquium of the Omohundro Institute of Early American History and Culture. Denver Brunsman, Kenneth M. Morrison, Jon Parmenter, Neal Salisbury, Linda Silverman, and an anonymous reader for the *William and Mary Quarterly* also gave constructive suggestions.

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island, responsible for filling the poor ignorant savages (as New England colonists commonly called Indians) with a greater sense of God.[1]

Cotton spent the next year studying the notoriously complex Wampanoag tongue, but this work was hardly enough training, as he discovered when he finally met with a native audience at Chappaquiddick on the Vineyard's east side on March 6, 1666. He plodded through his inaugural Wampanoag language sermon, and then perhaps breathed a sigh of relief assuming the hard work was done, only to have the Indians shower him with questions sharpened by two decades of Christian education under Mayhew and his Wampanoag assistants: "How conscience came to be asleepe or silent in a man at any time?"; "Whether Judas was saved or damned?" And perhaps most surprisingly, "Whether John Baptist onely sprinkled christs face with water or plunged him under water?" The following week in Nunnepog (Edgartown), Indian schoolteacher John Tackanash shared his belief with Cotton that it was "Gods revealed will" to answer prayers only if he deemed them good, an idea which was contrary to the instruction of senior Vineyard missionary Thomas Mayhew Sr. Another Wampanoag added that Mayhew failed to cite scripture in his sermons. Twice over the next month, Sengekontacket's William Lay (or Panunnut), a rising star among the Indians on the east side of the island, advertised his independent access to the Bible by requesting exegesis of several passages from Revelation, a book missionaries preferred to avoid.[2] Cotton had

[1] [John] Eliot and [Thomas] Mayhew [Jr.], *Tears of Repentance; or, A Further Narrative of the Progress of the Gospel Amongst the Indians in New-England* (London, 1653), in *Collections of the Massachusetts Historical Society*, 3d ser., 4 (1834): 231.

Cotton's career is traced in Mark A. Peterson, "The Plymouth Church and the Evolution of Puritan Religious Culture," *New England Quarterly* 66, no. 4 (December 1993): 582–91; Sheila McIntrye, "John Cotton Jr.: Wayward Puritan Minister?," in *The Human Tradition in Colonial America*, ed. Ian K. Steele and Nancy L. Rhoden (Wilmington, Del., 1999), 119–39. The Wampanoags of Martha's Vineyard were related literally and figuratively to the Indians of Nantucket, Cape Cod, and the mainland between Narragansett Bay to the west and Plymouth Bay to the east. The Wampanoags of these areas spoke a similar language (with some distinctive local accents), shared numerous other cultural traits, and intermarried extensively. Though most communities were left to guide their own affairs, each of them had paid tribute to the sachem of Pokanoket since at least the era of Massasoit's rule between ca. 1620 and 1660, extending through the tenure of his sons Wamsutta, or Alexander (1660–62) and Metacom, or Philip (1662–76)—thus the Wampanoags were sometimes referred to collectively as Pokanokets. The sachem, in turn, arbitrated intercommunity disputes, brokered trade and diplomacy, parceled out justice for egregious crimes, and led an occasional great hunt involving scores of his followers.

[2] On the complexity of New England Indian languages, see Henry Whitfield, *Strength out of Weaknesse; or, A Glorious Manifestation of the further Progresse of the Gospel among the Indians in New-England* (London, 1652), in *CMHS* 4 (1834): 181; Edward Winslow, *Good News from New England; or, A true Relation of things very remarkable at the Plantation of Plymouth in New England*, in *The Story of the Pilgrim*

gone head-to-head with New England's greatest minds during his college days, but handling sensitive challenges from lay congregants, never mind Indians, was startlingly unfamiliar. Fortunately, Cotton continued to record the Wampanoags' questions in his journal until he finally left the island in 1667. Historians tend to suspect the portrait of New England's Christian Indians presented in most cited primary sources because those accounts were written by missionary John Eliot and approved by Puritan leaders to raise donations for the evangelical effort. Cotton's journal, though, was private, and it furnishes compelling evidence that a broad cross section of Vineyard Wampanoags had become engaged, knowledgeable Christians.

Yet the Wampanoags' questions also contained hints that their Christianity was informed by and even consistent with their people's traditional faith. Seantan (or Sissetome) wanted to know "how God may be said to be a rock & fort to his people," like Wampanoag guardian spirits. Hearkening to the Wampanoag belief that guardian spirits resided in their wards' bodies, Lay asked, "How is a sinners heart satans house?" and "How doth sat[an] [kno]w the heart is empty of grace?" whereas Tackanash observed that "God had waited long knocking at the doore of their hearts before they would open to him." Hiacoomes's wife questioned "whether those that are buried in the sea shall rise againe at the last day, as well as those that are buried on land?" She might have puzzled Cotton, but the Wampanoags would have nodded in approval, since their ancestors taught that water was the opening to the underground lair of Cheepi, the god of the dead, whom they had recently come to identify with Satan.[3]

Scholars of Christian Indians, particularly the so-called praying Indians of New England, have reached a consensus that the natives' religious institutions, rituals, and other behaviors included Christian and traditional elements, often in syncretic form, yet few scholars have explored similar patterns in the natives' beliefs and fewer still have questioned how

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Fathers, 1606–1623, A.D., as Told by Themselves, Their Friends, and Their Enemies, ed. Edward Arber (1624; repr., London, 1897), 591; Experience Mayhew, "Letter of Experience Mayhew, 1722, on the Indian Language," *New England Historical and Genealogical Register* 39, no. 1 (January 1885): 12–17. Most linguists identify Wampanoags as speakers of Massachusett, one of the Algonquian languages. In the last decade, however, the Mashpee Wampanoag linguist Jessie Little Doe Fermino has argued that Wampanoags spoke a distinct language. It is in light of her unpublished work that I refer to a Wampanoag language. For the authoritative study of the Massachusett language, see Ives Goddard and Kathleen J. Bragdon, eds., *Native Writings in Massachusett*, 2 vols. (Philadelphia, 1988), esp. vol. 2.

Len Travers, ed., "The Missionary Journal of John Cotton, Jr., 1666–1678," *Proceedings of the Massachusetts Historical Society* 109 (1998): 59–60, 62.

[3] Travers, *PMHS* 109: 77, 80, 86, 88.

those beliefs developed. Leading studies of New England produced during the 1970s were skeptical of the Indians' Christianity. They rejected accounts of Indians suddenly seeing the light under the influence of altruistic missionaries and instead cast missionaries as ideological shock troops for colonial invasion whose zealotry blinded them to the fact that their supposed Indian converts were cynical fur traders, battered sycophants, or closet traditionalists.[4] During the 1980s and early 1990s, historians grew less critical of missionary intentions and, reflecting a scholarly trend toward highlighting the agency of American history's victims, began to assert that Indians sought out Christianity of their own accord. William S. Simmons argued that Martha's Vineyard became the site of the most successful Protestant mission in English North America because the island's Wampanoags believed that Christianity would protect them from epidemic disease and even the spells of their own shamans, whom they deeply respected but also feared. James P. Rhoda, James Axtell, Kathleen Joan Bragdon, and several others showed that Christianity was less imposed on Indians than pursued by them to reconstitute their frayed social structure and to cordon off some lands amid rapid colonial expansion. The praying Indians in these studies refashioned Christianity into something familiar by placing their standing elite in church offices, using Christian holidays and charity to express Indian communal values, adding Indian oratory and music to Christian rituals, and even reinforcing certain traditional gender roles

[4] Francis Jennings, "Goals and Functions of Puritan Missions to the Indians," *Ethnohistory* 18, no. 3 (Summer 1971): 197–212; Neal Salisbury, "Red Puritans: The 'Praying Indians' of Massachusetts Bay and John Eliot," *WMQ* 31, no. 1 (January 1974): 29–31; Kenneth M. Morrison, "'That Art of Coyning Christians': John Eliot and the Praying Indians of Massachusetts," *Ethnohistory* 21, no. 1 (Winter 1974): 77–92.

Exemplary studies of Indian Christianity outside of New England include John Webster Grant, *Moon of Wintertime: Missionaries and the Indians of Canada in Encounter since 1534* (Toronto, 1984), esp. 239–63; Thomas McElwain, "'The Rainbow Will Carry Me': The Language of Seneca Iroquois Christianity as Reflected in Hymns," in *Religion in Native North America,* ed. Christopher Vecsey (Moscow, Idaho, 1990), 83–103; John Steckley, "The Warrior and the Lineage: Jesuit Use of Iroquoian Images to Communicate Christianity," *Ethnohistory* 39, no. 4 (Fall 1992): 478–509; William G. McLoughlin, *The Cherokees and Christianity, 1794–1870: Essays on Acculturation and Cultural Persistence,* ed. Walter H. Cosner Jr. (Athens, Ga., 1994); Jane T. Merritt, "Dreaming of the Savior's Blood: Moravians and the Indian Great Awakening in Pennsylvania," *William and Mary Quarterly,* 3d ser., 54, no. 4 (October 1997): 723–46; Sergei Kan, *Memory Eternal: Tlingit Culture and Russian Orthodox Christianity through Two Centuries* (Seattle, 1999); Kenneth M. Morrison, *The Solidarity of Kin: Ethnohistory, Religious Studies, and the Algonkian-French Religious Encounter* (Albany, N.Y., 2002). The editors' introductory and concluding essays in Nicholas Griffiths and Fernando Cervantes, eds., *Spiritual Encounters: Interactions between Christianity and Native Religions in Colonial America* (Lincoln, Neb., 1999), 1–42, 276–85, skillfully treat the theoretical issues at play in this literature.

with appeals to Christian teachings.[5] Yet this rich scholarship rarely asked whether similar dialogical processes shaped the Indians' religious beliefs too, especially over the long term, since Puritan missionaries appeared far less likely than their Jesuit counterparts to tolerate religious melding. Only a few historians have begun to explore this question. Robert James Naeher, Charles L. Cohen, and Daniel K. Richter conclude that the praying Indians of Natick, Massachusetts, demonstrated an impressive knowledge of Puritan doctrine, contrary to earlier assumptions that reformed Protestantism was too cerebral to cross the linguistic and cultural divide.[6] Cohen and Richter caution, though, that the Indians did not share the Puritans' despair over original sin or ecstatic reception of God's grace, probably because of their own traditions of

[5] William S. Simmons, "Conversion from Indian to Puritan," *NEQ* 52, no. 2 (June 1979): 197–218; James P. Ronda, "Generations of Faith: The Christian Indians of Martha's Vineyard," *WMQ* 38, no. 3 (July 1981): 369–94; Kathleen Joan Bragdon, "'Another Tongue Brought In': An Ethnohistorical Study of Native Writings in Massachusett" (Ph.D. diss., Brown University, 1981); James Axtell, "Some Thoughts on the Ethnohistory of Missions," and "Were Indian Conversions *Bona Fide*?" in Axtell, *After Columbus: Essays in the Ethnohistory of Colonial North America* (New York, 1988), 47–57, 100–21; Harold W. Van Lonkhuyzen, "A Reappraisal of the Praying Indians: Acculturation, Conversion, and Identity at Natick Massachusetts, 1646–1730," *NEQ* 63, no. 3 (September 1990): 396–428; Bragdon, "Native Christianity in 18th Century Massachusetts: Ritual as Cultural Reaffirmation," in *New Dimensions in Ethnohistory: Papers of the Second Laurier Conference on Ethnohistory and Ethnology*, ed. Barry Gough and Christie Laird (Hull, Quebec, 1991), 119–26; Dane Morrison, *A Praying People: Massachusett Acculturation and the Failure of the Puritan Mission, 1600–1690* (New York, 1995); Jean M. O'Brien, *Dispossession by Degrees: Indian Land and Identity in Natick, Massachusetts, 1650–1790* (New York, 1997); Richard W. Cogley, *John Eliot's Mission to the Indians before King Philip's War* (Cambridge, Mass., 1999). This literature was anticipated by Susan L. MacCulloch, "A Tripartite Political System among Christian Indians of Early Massachusetts," *Kroeber Anthropological Society Papers* 34 (1966): 63–73. For a sensible overview, see Neal Salisbury, "'I Loved the Place of My Dwelling': Puritan Missionaries and Native Americans in Seventeenth-Century Southern New England," in *Inequality in Early America*, ed. Carla Gardina Pestana and Sharon V. Salinger (Hanover, N.H., 1999), 111–33.

[6] Henry W. Bowden and James P. Ronda, eds., introduction to *John Eliot's Indian Dialogues: A Study in Cultural Interaction* (Westport, Conn., 1980), 32; James Axtell, *The Invasion Within: The Contest of Cultures in Colonial North America* (New York, 1985). Compare with Neal Salisbury, "Religious Encounters in a Colonial Context: New England and New France in the Seventeenth Century," *American Indian Quarterly* 16, no. 4 (September 1992): 501–9. Robert James Naeher, "Dialogue in the Wilderness: John Eliot and the Indian Exploration of Puritanism as a Source of Meaning, Comfort, and Ethnic Survival," *NEQ* 62, no. 3 (September 1989): 346–68; Charles L. Cohen, "Conversion among Puritans and Amerindians: A Theological and Cultural Perspective," in *Puritanism: Transatlantic Perspectives on a Seventeenth-Century Ango-American Faith*, ed. Francis J. Bremer (Boston, 1993), 233–56; Daniel K. Richter, *Facing East from Indian Country: A Native History of Early America* (Cambridge, Mass., 2001), 111–29.

emotionally subdued relations with the spirits and emphasis on works over faith.

The Wampanoags of seventeenth-century Martha's Vineyard also developed a firm understanding of core Christian precepts. But documentary and archaeological evidence about the island further demonstrates *how* they did so: in partnership with their missionary, Thomas Mayhew Jr., they filtered Christian teachings through Wampanoag religious ideas and terminology—a process that one might call religious translation. Religious translation was not a temporary expedient on Mayhew's part in the hope that the Wampanoags' Christian beliefs and practices would eventually be purified. Nor was it a masquerade by Wampanoags merely parroting a catechism to secure temporal gains. It was, rather, an acknowledgment that Christian and native beliefs were analogous at several critical points. Religious translation on Martha's Vineyard evolved through three overlapping stages. In the first, during the mid- to late 1640s, the Wampanoags agreed to host Mayhew largely in response to an argument he crafted with a native assistant named Hiacoomes that God was the source of the Indians' spiritual power, "manit," and capable of protecting them against epidemic disease. In the second, during the 1650s and 1660s, Mayhew, mainland missionaries, and a growing number of Indian assistants translated other Christian concepts as accurately as possible into meaningful Wampanoag words and ideas and then dissected the particulars in response to native audiences. Finally, in the years leading up to and immediately following King Philip's War of 1675–76, Wampanoags took the lead in their own Christianization, establishing churches and courts in which the traditional elite assumed the new duty of punishing sin and spreading their people's indigenized Christianity among other Wampanoags. Awareness that these reforms took place in a cultural context shaped by religious translation makes them more intelligible as expressions of the Indians' Christianity rather than merely as concessions to colonial pressure. Contrary to the missionaries' ambitions, the Wampanoags' adoption of Christianity did not involve the complete abandonment of their old religious beliefs and identity for an entirely new order after being overwhelmed by the gospel. Instead, it was a process in which the Indians thought they were digging deeper into ancient wellsprings of spiritual power to recover its purest, most potent form and truths that had been with them opaquely all along.

By the end of the seventeenth century, many, and probably most, Wampanoags were informed devotees to a brand of Christianity at once consistent with the basics of reformed Protestantism and shaped by distinctly Indian concepts and values. Large numbers of them subscribed to

Christian tenets that humans were prone to bad deeds, that Jesus sacrificed himself to answer for this corruption, and that faith in God through Jesus's mediation was the only way to salvation. At the very least, a few became hand-wringing Calvinists with a firm comprehension of predestination and original sin. None of the Indians became Puritans in the sense of a desire to reform Christianity on a model of the primitive church. All of them became Congregationalists in that they emphasized the independence of their churches and the responsibility of local churchgoers to one another. Most important, they believed they had entered into an alliance with an unprecedentedly powerful spirit whose guardianship renewed their hope for the future without severing their ties to the past.

The Vineyard mission began in 1642 or 1643 with a friendship struck between a Wampanoag named Hiacoomes and an Englishman named Thomas Mayhew Jr., preacher to a small band of colonists that had just arrived on the island under the patent rights of Mayhew's father. The two were a natural pair. Mayhew aspired to evangelical work but had little experience with Indians. Hiacoomes craved fellowship and empowerment since his own people scorned him as a "contemptible person" who was "scarce worthy of their Notice or Regard."[7] So when Hiacoomes began attending the colonists' church services at their new settlement of Great Harbor (later renamed Edgartown), it was only a matter of time before he and Mayhew fell in together. As a result of their mutual tutorials, by 1644 Hiacoomes had achieved basic reading skills. Three years

[7] On the start of the Mayhew mission, see Lloyd Custer Mayhew Hare, *Thomas Mayhew: Patriarch to the Indians, 1593–1682* . . . (New York, 1932), chaps. 3–5; Charles Edward Banks, *The History of Martha's Vineyard, Dukes County, Massachusetts* (Boston, 1911), 1: 80–88, 104–26; Margery Ruth Johnson, "The Mayhew Mission to the Indians, 1643–1806" (Ph.D. diss., Clark University, 1966), 21–33; Neal Salisbury, "Prospero in New England: The Puritan Missionary as Colonist," in *Papers of the Sixth Algonquian Conference* (Ottawa, Canada, 1974), 253–73. On the origin of Thomas Mayhew Sr.'s patent, see Isabel Macbeath Calder, "The Earl of Stirling and the Colonization of Long Island," in *Essays in Colonial History, Presented to Charles McLean Andrews by his Students* (New Haven, Conn., 1931), 74–95.

Matthew Mayhew, *The Conquests and Triumphs of Grace: Being a Brief Narrative of the Success which the Gospel hath had among the Indians of Martha's Vineyard (and the Places adjacent) in New-England* (London, 1695), 23 ("contemptible person"); Experience Mayhew, *Indian Converts; or, Some Account of the Lives and Dying Speeches of a Considerable Number of the Christianized Indians of Martha's Vineyard in New-England* (London, 1727), 1–2 ("Notice or Regard"). Hiacoomes might have been a member of the lowest Wampanoag social order that was "known to be *Strangers* or *Forreigners*," and "not Priviledged with *Common Right*," such as accompanying the sachem on his annual hunting drives. See Mayhew, *Conquests and Triumphs*, 14–15, 23; Roger Williams, *A Key into the Language of America*, ed. John J. Teunissen and Evelyn J. Hinz (1643; repr., Detroit, Mich., 1973), 96.

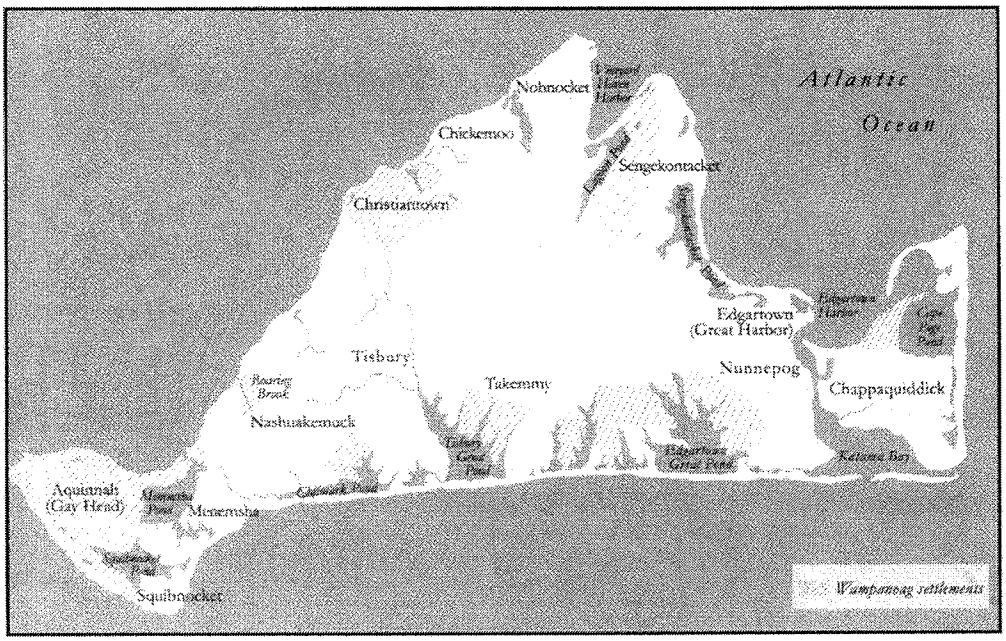

FIGURE I

Martha's Vineyard, ca. 1665–75, with areas of clustered Indian and English settlement. Drawn by Rebecca L. Wrenn.

later Mayhew reportedly spoke Wampanoag with "good understanding" and Hiacoomes and his wife had declared themselves Christians. Mayhew also sought out Hiacoomes's knowledge about Wampanoag religion, probably motivated by a conviction (often associated with his Jesuit contemporaries but rarely with Puritans) that missionaries could attract natives to Christianity by appealing to their traditions.[8]

New England Indian religious life centered on influencing the effects of spiritual power, called manit, by establishing reciprocal relations with holders of that power, known as manitous. Manit flowed through the Indians' universe, yet it was particularly strong in extraordinary things such as meteorological forces, prominent topographical features, and remarkable animals including bears and black wolves. Its most powerful sources were the spirits behind all the forms and elements of the world. In mythic times, the era in which the Indians' origin stories took place, humans formed a single symbiotic community with these spirits. They shape shifted into each other's likenesses, spoke one

[8] Henry Whitfield, *The Light appearing more and more towards the perfect Day; or, A farther Discovery of the present state of the Indians in New-England . . .* (London, 1651), in *CMHS* 4 (1834): 107 ("good understanding"); Edward Winslow, *The Glorious Progress of the Gospel, amongst the Indians in New England* (London, 1649), in *CMHS* 4 (1834): 78. For a comparative analysis of Jesuit and Puritan missions, see Axtell, *Invasion Within.*

another's languages, married, made love, fought, and in every respect behaved like kin and neighbors. This fluidity no longer characterized the Indians' material world, but it lived on in the natives' visions and dreams, and the spirits continued to influence the Indians' everyday lives—for instance, a giant deer spirit controlled the abundance and distribution of deer herds; the rain spirit decided whether showers would fall; the spirit of a shoreline rock might determine if canoes could pass. Maintaining good relations with the spirits, then, was the Indians' firmest guarantee of worldly success. On a daily basis this goal required the natives to honor the spirits with ritual and probe dreams for the spirits' instructions. A lifetime of spiritual favor, though, was best achieved through a vision quest. This seminal rite of passage involved a young man depriving himself of sleep and food and taking emetics in the hope of contacting one or more manitous, who would then take him on a shape-shifting adventure. The journey, a return to the power of the Indians' mythic times, might involve diving under the water with the spirits Turtle or Serpent, or visiting Beaver's lodge or Bear's den. Each experience was unique in detail but the lesson was the same: humans would find power and truth by collapsing the boundaries of their fleshy selves and entering a spirit world where human, plant, animal, and element were mutually dependent kin and ontologically the same. The edified seeker pledged to live the rest of his life by this principle, which meant always addressing the manitous humbly and treating their flesh and blood respectfully. The spirits, in turn, took residence in the seeker's body and provided him with songs and fetishes to procure their manit during times of need. It was precisely this kind of reciprocity with the spirits that separated great hunters and warriors from poor ones, and in recognition of such a transformation, a young man's successful vision quest earned him a new name. For young women an equivalent life event was their seclusion at first and subsequent menses, but there are few details in the historical record that address the spiritual side of this custom.[9]

[9] For discussions of manit, see Constance A. Crosby, "From Myth to History, or Why King Philip's Ghost Walks Abroad," in *The Recovery of Meaning: Historical Archaeology in the Eastern United States*, ed. Mark P. Leone and Parker B. Potter Jr. (Washington, D.C., 1988), 192–98; Kathleen J. Bragdon, *Native People of Southern New England, 1500–1650* (Norman, Okla., 1996), 184. On vision quests and guardian spirits, see Calvin Martin, *Keepers of the Game: Indian-Animal Relationships and the Fur Trade* (Berkeley, Calif., 1978); Martin, *The Way of the Human Being* (New Haven, Conn., 1999); Åke Hultkrantz, *The Religions of the American Indians*, trans. Monica Setterwall (Berkeley, Calif., 1979), 66–83. In *Solidarity of Kin*, Morrison submits that Northeast Algonquian (a language family that included the Wampanoags) believed there was no ontological difference between people and spirits or between the real and supernatural. By contrast I argue that the Indians made such distinctions in their everyday lives, but thought of visions and dreams as places where the fluidity of mythic times persisted.

Soul wandering during dreams also exposed natives to the spirit realm. New England Indians believed every individual had two souls. The first, called "Míchachunck" in Narragansett, resided in the human heart and served as the body's animating force. During the dream state, it remained within the sleeping person to keep him or her alive. The other soul, "Cowwéwonck," traveled the evening in the form of a light to interact with other spirits. These wandering souls discovered lost objects and the identity of witches; they heard from spirit beings about where to find game animals; sometimes they learned about the manitous' eccentric desires. Cowwéwonck, in short, exposed sleeping humans to the invisible workings that shaped their waking hours.[10]

Cheepi (also known as Hobbomock and Abbomocho), the "god of the dead," was the most powerful spirit in Wampanoag visions and dreams, and the English could not mistake that he shared a number of qualities with Satan. Cheepi resided in the underworld, inclined toward wickedness, shape shifted, and typically appeared as a horned serpent casting the shadow of a man. His presence could also be found in the color black, the cold northeast wind, probably the moon, and an illuminative blur that hovered over people's deathbeds. Jealousy, which Indians considered the most tragic character flaw and the source of witchcraft, dominated Cheepi's personality, leading him to arbitrarily torment humans with "incurable Diseases . . . Apparitions and panick Terrours," including hauntings by the ghosts of "Murtherers, thieves, and Lyers" who were temporarily shut out of the Indian afterlife and condemned to wander under his governance. Consequently, New England Indians directed their prayers toward Cheepi for relief. As the Narragansetts explained, "the Evil Power hurts us, does all the Mischief, and who should we seek to to [*sic*] prevent or remove Mischief but to him that does it."[11]

Indians whom Cheepi contacted during the vision quest became powwows (or shamans); they were admired by neighbors for their abilities (variously held) to cure, affect the weather, or tell the future, but they

[10] Williams, *Key into the Language of America*, 193–94; John Josselyn, "The Second Voyage," in *John Josselyn, Colonial Traveler: A Critical Edition of* Two Voyages to New-England, ed. Paul J. Lindholdt (1674; repr., Hanover, N.H., 1988), 95–96; Bragdon, *Native People of Southern New England*, 191.

[11] Eliot and Mayhew, *Tears of Repentance*, 202 ("god of the dead"); Williams, *Key into the Language of America*, 194 ("Murtherers"); William Wood, *New England's Prospect*, ed. Alden T. Vaughn (1634; repr., Amherst, Mass., 1977), 111–12. See also the discussion of the Narragansett word for northeast wind, "chepewéssing," in James Hammond Trumbull, *Natick Dictionary*, Bureau of American Ethnology Bulletin 25 (Washington, D.C., 1903), 250, under the heading "east." Josselyn, "Second Voyage," 95–96; Franklin Bowditch Dexter, ed., *The Literary Diary of Ezra Stiles, D.D., LL.D.* (New York, 1901), 1: 385–86 ("Evil Power"). See also [John Eliot], *The Day-Breaking, If Not The Sun-Rising of the Gospell With the Indians in New-England* (London, 1647), in *CMHS* 4 (1834): 17.

were also detested and feared as potential witches. Marshaling these powers required the powwow to dance, contort, and shout until reaching a state of ecstasy in which his (and sometimes her) Cowwéwonck could solicit the assistance of Cheepi and lesser manitous. But the spectacle did not end there. The powwow amazed onlookers by broadcasting his Cowwéwonck's interactions with the manitous, "sometimes roaring like a Beare, other times groaning like a dying horse, foaming at the mouth like a chased boar, smiting on his naked breast and thighs with such violence, as if he were mad." If, during these exchanges, the manitous diagnosed a sick person as cursed by a witch's dream spirit, the powwow then captured that spirit in a fly or mosquito to crush it dead.[12] Such talents won the powwow esteem but, if antagonized, he could use Cheepi's power to kill as well as to cure.

The spirit Kiehtan (also known as Cautantowwit) balanced Cheepi in almost every way. Kiehtan lived toward the southwest as sachem of the Wampanoag afterworld, which he provided with a steady round of pleasant weather, robust harvests, and plentiful game. He also favored Wampanoags in the present; that is, when he was able to thwart Cheepi's obstructions. Southern New England Indians had a tradition of dedicating their harvest celebrations to him, but by the early seventeenth century Wampanoags had become "more and more cold in their worship to Kiehtan; saying in their memory, he was much more called upon." Some natives blamed this neglect for a deadly epidemic that raged southward from the Saco River of Maine from 1616 to 1619. It stopped suddenly before entering the Narragansetts' country, ostensibly because of a new ceremony in which the people sacrificed riches to Kiehtan.[13]

The Indians' interpretation of this sickness illustrates that they were fully capable of using their religion to explain severe crises if they were left

[12] Wood, *New England's Prospect*, 101 ("roaring like a beare"); Eliot, *Day-Breaking*, 20. For secondary treatments of New England powwows, see William S. Simmons, "Southern New England Shamanism: An Ethnographic Reconstruction," in *Papers of the Seventh Algonquian Conference, 1975*, ed. William Cowan (Ottawa, Canada, 1976), 217–56; Bragdon, *Native People of Southern New England*, 203–14; more generally, Mircea Eliade, *Shamanism: Archaic Techniques of Ecstasy*, trans. Willard R. Trask (Princeton, N.J., 1972); Hultkrantz, *Religions of the American Indians*, 84–102. Mayhew, *Conquests and Triumphs*, 20; Cotton Mather, *Magnalia Christi Americana; or, The Ecclesiastical History of New England* (1702; repr., Hartford, Conn., 1853), 2: 445.

[13] Wood, *New England's Prospect*, 111; Roger Williams to Thomas Thorowgood, Dec. 20, 1635, in Glenn W. LaFantasie, ed., *The Correspondence of Roger Williams* (Hanover, N.H., 1988), 1: 30. More generally on Indian beliefs about Cheepi, Kiehtan, and the afterworld, see William Scranton Simmons, *Cautantowwit's House: An Indian Burial Ground on the Island of Conanicut in Narragansett Bay* (Providence, R.I., 1970), chap. 4; Winslow, *Good News from New England*, 585 ("worship to Kiehtan"). For the best study of this outbreak, see Timothy L. Bratton, "The Identity of the New England Indian Epidemic of 1616–1619," *Bulletin of the History of Medicine* 62, no. 3 (Fall 1988): 351–83.

alone and given enough time. But the Wampanoags on Martha's Vineyard in the seventeenth century were no longer alone and time was short. Mayhew launched his mission in 1643, just as a "strange disease" breached the island shore casting an unmistakable pall of terror. The Wampanoags ran "up and down till they could run no longer" and "made their faces as black as a coale, snatched up any weapon, spake great words, but did no hurt," probably as a ritual to frighten off the ghosts of the dead or the spirits behind the killing. The epidemic's end must have renewed the Wampanoags' faith in this rite but only temporarily, for in 1645 they were struck by another disease, a "universal" and "sore Distemper" that was "mortal to many of them."[14] These two outbreaks wiped out as many as half of the Vineyard Wampanoags and shook survivors to their core.

Such violent and unfamiliar European diseases unnerved the Indians' stoutest men. As Plymouth's William Bradford graphically explained, the Indians feared the most lethal contagion of all, smallpox, "more than the plague" because it reduced its victims to a "lamentable condition . . . the pox breaking and mattering and running one into another . . . they will be all of a gore blood, most fearful to behold . . . they die like rotten sheep." Leaders whom the people relied upon for defense, subsistence, wisdom, and religious instruction suddenly fell dead in bunches. Loss of life on this scale would have undermined any society, but it was particularly damaging to one without writing, since specialized knowledge died out with its keepers. Then there was the psychological fallout. In a study of modern disasters such as toxic poisonings, sociologist Kai Erikson writes that few experiences are as destabilizing as watching kith and kin destroyed from inside by an unknown force. Survivors become nervous and depressed, plagued by nightmares of their loved ones' ordeals and by a general feeling of helplessness. When an entire community shares in this suffering, its experience is best understood as social trauma, which "at its worst, can mean not only a loss of confidence in the self but a loss of confidence in the scaffolding of family and community, in the structures of human government, in the larger logics by which humankind lives, and in the ways of nature itself." Or, as one mainland colonist wrote of Indians coping with the devastation of epidemic disease, "their courage [is] much abated, and their countenance is dejected, and they seem as a people affrightened."[15]

[14] Whitfield, *Light appearing*, 110–11 ("strange disease"); Mayhew, *Indian Converts*, 77 ("sore Distemper"); Morrison, *Praying People*, 6. The identity of this sickness is also unknown. In 1646, however, Indians on the Kennebec River suffered "a malady which caused vomiting of blood" and "destroyed a good part of their nation." That outbreak also opened the door for a Christian mission. See Kenneth M. Morrison, *The Embattled Northeast: The Elusive Ideal of Alliance in Abenaki-Euramerican Relations* (Berkeley, Calif., 1984), 83.

[15] William Bradford, *Of Plymouth Plantation, 1620–1647*, ed. Samuel Eliot Morison (New York, 1952), 270–71 ("smallpox"). Kai T. Erikson, *A New Species of*

Indians, no less than their English neighbors, inhabited a world of spirits in which there were no accidents. They scrutinized even commonplace troubles such as failed crops for signs of a manitou's displeasure or a person's witchcraft. After repeated strikes by invisible, anonymous killers, they interrogated their world with greater desperation. Some mainland Indians linked the new diseases to a comet and others to a curse uttered by a shipwrecked Frenchman they had enslaved. On the Vineyard Wampanoags "laid the cause of all their wants, sicknesses, and death, upon their departing from their old heathenish ways" and, though they might have been collectively guilty for their neglect of Kiehtan, Hiacoomes was individually suspect as a witch.[16] He walked around displaying a primer the English had given him and, during the early stages of colonization, Indians often associated writing's soundless transfer of thought with shamanistic magic.[17] Hiacoomes was able to read the Bible, a book the English revered as the very word of God, which suggested that this marginal fellow had access to the colonists' potent spiritual power—power that had shielded Englishmen from the epidemics and perhaps caused them as well. Hiacoomes had forsworn

Trouble: Explorations in Disaster, Trauma, and Community (New York, 1994), 242; [Edward] Johnson, *Johnson's Wonder-Working Providence, 1628–1651*, ed. J. Franklin Jameson (New York, 1910), 36; William Cronon, *Changes in the Land: Indians, Colonists, and the Ecology of New England* (New York, 1983), 90 ("people affrighted"). On epidemic diseases, see also Alfred W. Crosby, "Virgin Soil Epidemics as a Factor in the Aboriginal Depopulation in America," *WMQ* 33, no. 2 (April 1976): 289–99; William H. McNeill, *Plagues and Peoples* (Garden City, N.Y., 1976), esp. 206; Rodney Stark, *The Rise of Christianity: How the Obscure, Marginal Jesus Movement Became the Dominant Religious Force in the Western World in a Few Centuries* (San Francisco, 1997), 73–94.

[16] Simmons, "Southern New England Shamanism," 3; William S. Simmons, *Spirit of the New England Tribes: Indian History and Folklore, 1620–1984* (Hanover, N.H., 1986), chap. 3; Bragdon, *Native People of Southern New England*, 192–93, 198–99, 207–8; Johnson, *Johnson's Wonder-Working Providence*, 39–40; Nathaniel Morton, *New-England's Memorial; or, A brief Relation of the most Memorable and Remarkable Passages of the Providence of God* . . . (Boston, 1721), 36; Whitfield, *Light appearing*, 110 ("heathenish ways").

[17] James Axtell, "The Power of Print in the Eastern Woodlands," in Axtell, *After Columbus*, 86–99. Compare with Peter Wogan, "Perceptions of European Literacy in Early Contact Situations," *Ethnohistory* 41, no. 3 (Summer 1994): 407–29. Axtell limits his discussion to New France and discounts the power of writing in New England for three reasons: (1) by the time John Eliot launched his mission, the novelty of print had diminished for Indians; (2) unlike their Jesuit counterparts, Puritans were unwilling to put the Indian impression of their writing skills as shamanistic power to missionary ends; and (3) religious works were quickly available in Algonquian and native children were taught to read and write, distributing these skills. All these points certainly apply to mainland Massachusetts. On the Vineyard, however, Indians did not have steady contact with colonists before 1642. Nor were Mayhew and, more important here, Hiacoomes, as inflexible as Eliot. Lastly, Algonquian-language writings were neither available for another ten years nor widely distributed for another twenty years.

the powwows under Mayhew's influence, yet the diseases had spared him, his family, and his English friends. Even Wampanoags he proselytized "did not taste so deeply of it." His deviance grew so alarming that the Chappaquiddick sachem Pakeponesso intervened, chastising Hiacoomes "for his fellowship with the English, both in their civil and religious wayes, railing at him for his being obedient to them." Wampanoags would have expected someone of low rank like Hiacoomes to defer to a sachem's wishes, but he defiantly vowed to stay the course even after Pakeponesso gave him "a great blow on the face with his hand." Hiacoomes told a friend that Jehovah would exact retribution, and a short time later a bolt of lightning struck the sachem and nearly killed him. Mayhew related that "now Hiacoomes (as himself saith) did remember his former thoughts of God, and then thought God did answer him, and that he was brought more to rejoyce in God, and rest more upon him." His neighbors agreed that Hiacoomes had discovered something powerful, which put them "upon serious consideration."[18]

The Wampanoags' concerns led the petty sachem of Nunnepog, Myoxeo, to invite Hiacoomes to speak to an assembly about his newfound potency, a remarkable change of fortune for a man the Wampanoags once derided for having "nothing to say in all their meetings." Imbued with confidence from his new guardian spirit and English contacts, Hiacoomes rose to the task, opening with a lengthy speech about "all things he knew concerning God the Father, Sonne and Holy Ghost," then turning to the real test: addressing the questions of a skeptical but forlorn audience. Myoxeo wondered just how many gods the English worshipped. "Hiacoomes answered *ONE, and no more.* Whereupon Miohqsoo reckoned up about 37 principal Gods which he had; *and shall I, said he, throw away all these 37 for the sake of one only*?" Hiacoomes's response burrowed to the heart of the audience's interest in Christianity. He declared, "he did fear the great God only," not the ancestral spirits, adding "*For my part I have thrown away all these, and many more, some Years ago, and yet I am preserved as you see this Day.*" He went on to explain, "in a speciall manner," basic Protestant tenets such as the fall, original sin, Jesus's sacrifice for believers, and the need to confess and repent for one's offenses against God, but probably his clearest message was that the Wampanoags needed to strive against a long list of "sins" to secure Jehovah's protection.[19]

In lieu of these reforms, Wampanoags sought out medical attention from Mayhew, who brilliantly, and quite consciously it seems, played the

[18] Whitfield, *Light appearing*, 111, 116 (quotations, 109–11); Mayhew, *Indian Converts*, 4.

[19] Mayhew, *Indian Converts*, 5 ("nothing to say"), 78 ("he did fear"); Whitfield, *Light appearing*, 111–12.

role of Christian powwow the Indians had cast for him. Called to the bedside of a sixty-year-old man named Ieogiscat, Mayhew "by reasoning with him convinced him of the weaknesse and wickednesse of the Pawwaws power; and that if health were to be found, it must be had from him that gave life, and breath, and all things; I commended this case unto the Lord." Ieogiscat's recovery after the Wampanoags had resigned him to death seemed to confirm Mayhew's words. Still, Saul, the ailing son of Pakeponesso, turned a deaf ear to Mayhew's counsel, including his warning that reverting to the powwows in full knowledge of Christianity would evoke God's fury. Just as the missionary predicted, "so it shortly came to passe." Mayhew's fortune peaked when he cured the son of the Nunnepog sachem Tawanquatuck. Missionaries universally acknowledged that their success depended on the support of Indian leaders, and yet Mayhew had previously found "the Sagamores [or sachems] were generally against this new Way." Reflecting on the recovery of his son, especially in the wake of Hiacoomes's stunning transformation, Tawanquatuck concluded that his people's future lay in the mission. He confided to Mayhew "that a long time ago the Indians had wise Men among them, that did in a grave manner teach the People Knowledge; but they, said he, are dead, and their Wisdom is buried with; them." To restore wisdom, confidence, and spiritual power to his followers, Tawanquatuck arranged for Mayhew to hold Christian instruction in Nunnepog every other week.[20] By 1650 this meeting boasted some fifty members who pledged to follow in God's path.

Transforming the Wampanoags' interest in Christianity into firm commitment required Mayhew and Hiacoomes to identify and expand on similarities between the Wampanoags' customary spiritual beliefs and Christianity. To encourage the Wampanoags to accept monotheism, Mayhew, certainly with Hiacoomes's input, proposed that the Indians had "an obscure Notion of a god greater than all, which they call *Mannit*, but they knew not what he was, and therefore had no way to worship him." Now they did, since in Mayhew's formulation God became the source and embodiment of all manit in the world. Similarly, Mayhew cast Cheepi as Satan, Christianity's own sachem of the damned, and warned that appeals to him henceforth would provoke God's jealous wrath as never before. Mayhew also boasted that God, at his whim,

[20] Winslow, *Glorious Progress*, 78, 77 ("Powwaws power"); Axtell, *Invasion Within*, 143; Salisbury, *WMQ* 31: 37; [Thomas] Prince, *Some Account of those English Ministers who have Successively Presided Over the Work of Gospelizing the Indians on Martha's Vineyard and the Adjacent Islands* (London, 1727), appendix to Mayhew, *Indian Converts*, 283 ("Sagamores"); Whitfield, *Light appearing*, 112; Mayhew, *Indian Converts*, 80.

could make Cheepi and the other Wampanoag spirits "all flee away like Muskeetoes," a subtle reference to the powwows' ability to imprison dream souls in insects. A powwow asked, "had his Imps," or guardian spirits, "gone from him, what he should have instead of them to preserve him?" Mayhew answered "that if he did beleeve in Christ Jesus, he should have the Spirit of Christ dwelling in him, which is a good and a strong Spirit, and will keep him so safe, that all the Devils in Hell, and Pawwaws on Earth, should not be able to do him any hurt," alluding to the Wampanoags' belief that guardian spirits lay "treasured up in their bodies."[21] Mayhew's overall point was that Christianity obviated the Wampanoags' lesser manitous by leading its followers to the supreme source of manit and, as such, the power they needed to protect themselves from danger.

Yet Wampanoags did not embrace Christianity in large numbers until Hiacoomes convinced them that Mayhew's words were truthful. In 1649 participants in the Christian meeting admitted that even after years of instruction, "there is not any man which is not afraid of the Pawwawes." Then and there Hiacoomes proved otherwise, making the unprecedented declaration that he was impervious to the powwows because of his faith in God. Buoyed by his example, a few others shook their timidity to make similar claims. But the powwows did not give up so easily. One barged into a Christian gathering to avow, "I know the meeting Indians are lyars; you say you care not for the Pawwawes . . . the Pawwawes could kill all the meeting Indians if they did set about it." Hiacoomes took up the challenge, daring "that he would be in the midst of all the Pawwawes on the Iland that they could procure, and they should do their utmost they could against him, and when they did their worst by their witchcrafts to kill him, he would without feare set himself against them." For good measure he added, "that he did put all the Pawwawes under his heel." Wampanoags probably interpreted Hiacoomes's remarks as a boast that, with his new spirit protector, he could destroy the shamans' dream souls. Neither Hiacoomes nor any other praying Indians fell victim to powwow sorcery despite these confrontations, which made Mayhew and Hiacoomes's case appear foolproof to much of the Wampanoag public. As William S. Simmons writes, "to continue to believe in shamans denied one the greater healing power of the English God, and made one vulnerable to the injuries believed to be caused by shamans to which Christians were immune. Furthermore, [Mayhew] interpreted all suffering among nonbelievers as punishment from God for their sins, which included foremost the refusal to accept God's way. Mayhew thereby usurped the shamans' final power, the abil-

[21] Eliot and Mayhew, *Tears of Repentance*, 202, 205; Axtell, *Invasion Within*, 225.

ity to cure sorcery victims, by interpreting sorcery as an expression of God's displeasure with those who continued to believe in shamans." Such thinking, reinforced by the increasingly clear benefits of using Christianity to ally with the English and the growing number of mainland praying Indians, led to the rapid expansion of the meeting. By 1653, 283 adults, including 8 powwows, had vowed "to renounce their false Gods, Devils, and Pawwaws, and publickly, in set meetings, before many witnesses . . . to embrace the Word and Way of God." By the mid-1660s Christian services took place at every corner of the island, and by 1674 all but one of the Vineyard's three hundred or so Indian families called themselves Christians.[22]

There is a substantial historical record of Indian communities with missions splitting into Christian and traditionalist parties, often along preexisting political fault lines, but these trends were muted on the Vineyard.[23] Tawanquatuck was the target of an assassination attempt shortly after he endorsed the Christian meeting, and the sachemship of Aquinnah, which was heavily influenced by the antimission policies of the mainland Wampanoag leader Massasoit, actually banished its sachem, Mittark, for a few years after he came out in favor of Christianity. Overall, though, opposition to the meeting was weak. There is no evidence of further violence or of contending religious factions forming separate communities. To some extent the lack of foreign policy choices for island Wampanoags explains the lack of opposition. They were not courted by multiple imperial powers, quite unlike Indians along the borders of New France, New Netherland, and New England, or in the southeast between French Louisiana, Spanish Florida, and English South Carolina, and therefore the meeting was not associated with one alliance over another. For reasons that are somewhat unclear, island Indians did not produce wampum to exchange with the English, so trade was not a major issue. Their options were to engage the English to one degree or another or withdraw at the risk of appearing hostile. So little is

[22] Whitfield, *Light appearing*, 115–16, 184; Simmons, *NEQ* 52: 209; Eliot and Mayhew, *Tears of Repentance*, 203; Prince, *Some Account of those English Ministers*, 290; Daniel Gookin, "Historical Collections of the Indians in New England," in *CMHS*, 1st ser., 1 (1792): 205; Thomas Mayhew Sr. to the Commissioners of the United Colonies, Aug. 23, 1671, in John W. Ford, ed., *Some Correspondence between the Governors and Treasurers of the New England Company in London and the Commissioners of the United Colonies* (London, 1896), 40.

[23] Daniel K. Richter, "Iroquois Versus Iroquois: Jesuit Missions and Christianity in Village Politics, 1642–1686," *Ethnohistory* 32, no. 1 (Winter 1985), 1–16; Rebecca Kugel, *To be the Main Leaders of Our People: A History of Minnesota Ojibwe Politics, 1825–1898* (East Lansing, Mich., 1998); Karim Michel Tiro, "The People of the Standing Stone: The Oneida Indian Nation from Revolution through Removal, 1765–1840 (New York)" (Ph.D. diss., University of Pennsylvania, 1999), 147–99.

known about the Wampanoags' social structure (particularly the people's clans) and local issues that mission politics cannot be linked to village politics. What it clear is that the succession of epidemic disease, the onset of the mission, Hiacoomes's transformation, and the discrediting of the powwows made Christianity appealing to the Wampanoags for religious reasons, which appears to account for most of the mission's momentum.

Wampanoag neophytes had ample opportunity to discuss the reformed Protestant creed. Their weekly Sabbath meetings included prayer, the catechism, Bible readings, psalm singing, a sermon, and preaching. Then, in the winter of 1652, Mayhew established an Indian day school, which soon employed a nine-man workforce, including eight Wampanoag schoolmasters, to teach young people the catechism, reading, and writing, mostly in Wampanoag although sometimes in English. Two years later mainland missionary John Eliot began publication of native language primers, psalms, sermons, and, in 1663, the entire Bible. Print runs large enough to supply a Bible to every Christian Indian family, combined with public readings by literate Wampanoags, brought these works to the eyes and ears of nearly everyone on the island. Moreover, Wampanoags held question-and-answer sessions after Sunday meeting and at midweek. In a span of just twenty months during the 1660s, John Cotton Jr. alone conducted 119 of these events among six different villages.[24] Such work, in addition to the schools, Sabbath meetings, recitations, and informal gatherings, meant the Wampanoags were receiving a steady stream of Christian education.

Since the Wampanoags' instruction took place in their own language, missionaries and their Indian interpreters had to search for appropriate native terms to express Christian concepts, perhaps the tallest of tasks in cross-cultural dialogue. Nearly a century later, David Brainerd, missionary to the Wampanoags' linguistic relatives, the Delawares of New Jersey, called such work "extremely discouraging"

[24] Eliot and Mayhew, *Tears of Repentance*, 208; Prince, *Some Account of those English Ministers*, 289. On the "Indian Library," see Frederick L. Weis, "The New England Company of 1649 and Its Missionary Enterprises," *Publications of the Colonial Society of Massachusetts, Volume 38, Transactions 1947–1951* (Boston, 1959), 216–18; William Kellaway, *The New England Company, 1649–1776* (New York, 1961), chap. 6; Bragdon, "Another Tongue Brought In," chap. 2; Jill Lepore, *The Name of War: King Philip's War and the Origins of American Identity* (New York, 1998), 30–41; Cogley, *John Eliot's Mission to the Indians*, 119–24; Edward G. Gray, *New World Babel: Languages and Nations in Early America* (Princeton, N.J., 1999), chap. 3.

During the 1660s the number of visits by Cotton per village was as follows: Chappaquiddick (42); Nashamoiess/Nunnepog (35); Sengekontacket (21); Takemmy (17); Tawanquatuck's Neck (2); Nashuakemuck (2). Native teachers were responsible for the outlying areas of Aquinnah, Nashuakemuck, and Menemsha (data culled from Travers, *PMHS* 109).

because "There are no Words in the *Indian* Language to answer our English Words, *Lord, Saviour, Salvation, Sinner, Justice, Condemnation, Faith, Repentance, Justification, Adoption, Sanctification, Grace, Glory, Heaven*, with scores of the like Importance." Yet Brainerd somehow managed to teach his Delaware interpreter enough Christian doctrine until, finally, the man was "capable of understanding and communicating without mistakes, the *Intent and Meaning* of my Discourses, and that without being confined *strictly* and oblig'd to interpret *verbatim*." Brainerd's New England predecessors cultivated Indian brokers of a similarly high standard: Mayhew had the aid of Hiacoomes and John Eliot worked alongside Cockenoe, a Montauk enslaved during the Pequot War, and John Sassamon, a man of Wampanoag-Massachusett descent who had spent his adolescence among the English. The advice of these Indians convinced Eliot to title the Gospels "Wun-aun-chemok-aonk," drawing on the native word, "Wun-nam-moo-waonk," meaning truth, which Puritans agreed was the Bible's significance. He preferred to leave God and Jesus Christ untranslated for fear of corrupting them, but occasionally followed Mayhew's lead by using "Manitoo" for God. "Matche-anitto" stood for the Devil in Eliot's writings, combining the native word for bad, "matchit," with manitou, but he, like Mayhew, conflated Satan and Cheepi in his translation of hell as "Chepiohkomuk." Eliot told his charges that "sinners should bee after death, Chechainuppan, *i.e.* tormented alive, (for wee know no other word in the tongue to expresse extreame torture by)." Other missionaries used the phrase "Awakompanaonk chepiohkomuk" for the misery of hell, which in Wampanoag meant something like lost people of Cheepi's place. Indians might have understood this term as a reference to the souls of malicious evildoers sentenced to haunt under Cheepi's rule before being admitted into Kiehtan's house. Abraham Peirson of Long Island called the souls themselves "Mittachonkq," the force in the natives' dual-soul scheme that kept the body alive while the other soul explored the dreamscape. In the early eighteenth century, Cotton Mather, who probably drew on Eliot's writings or consulted with the Vineyard's Experience Mayhew, used "negonne kuhquttum" for predestination, which literally translated meant previously appointed, and "pomantamooganit" for resurrection, drawing on the native terms "pomantam" (he lives) and "moocheke" (much, many more).[25] Christianity was filled with

[25] David Brainerd, *Mirabilia Dei inter Indicos; or, The Rise and Progress of a Remarkable Work of Grace Amongst a Number of the Indians in the Provinces of New-Jersey and Pennsylvania . . .* (Philadelphia, [1746]), 70–72, 226–28; Lepore, *Name of War*, 21–47; Eliot, *Day-Breaking*, 13 ("Chechainuppan"); [Josiah Cotton], "Cotton's Vocabulary of the Massachusetts (or Natick) Indian Language," in *CMHS*, 3d ser., 2 (1830): 155 ("Awakompanaonk chepiokohmuk": *auwa, auwog, auwate* = them, people, anyone; *ompenumanut* = to lose them; *ompenum* = he looseth it; chepi = Cheepi::Satan; kohmuk = district); Abraham Peirson, *Some Helps for the Indians:*

novel concepts, but applying Wampanoag names to them and then qualifying the definitions over and over again through face-to-face meetings had the potential to bring dedicated Indian Christians into close, if not always exact, alignment with their English counterparts.

Tenacious Wampanoag questioning left missionaries with little choice but to teach these doctrines within an Indian framework. Painfully fresh memories of epidemic disease led Wampanoags to ask Cotton: "Why doe [th]ose that are come to [Christ] afterward meete with troubles?"; "Whether faith will . . . heale the sick?"; "How doth the sp[iri]t Keepe out infirmities?" And the terrifying query, "what is meant by Gods visiting the Iniquity of the fathers upon the children to the 3d & 4th generation?" The Wampanoags feared going to heaven would separate them from their ancestors, prompting questions about "whether our fathers that died before they heard of God or knew him are saved or not," and the fate of infants who perished before they received the Word. Other Indians wondered how to judge certain customs in light of Christian teaching. If a man had two wives on joining the Christian meeting, which one should he divorce? What can separate husband and wife? What should be made of Luke 14:12, which reads: "When thou makest a dinner or a supper, call not thy friends, nor thy brethren, neither thy kinsmen, nor thy rich neighbors; lest they also bid thee again, and a recompense be made thee"? Was this a condemnation of the Wampanoags' communal ethic? John Amanhut's wife was interested in Revelations 12:1–2, which reads, "there appeared a great wonder in heaven; a woman clothed with the sun, and

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Shewing Them How to improve their natural Reason, To know the True God, and the true Christian Religion . . ., in John Eliot, *A further Accompt of the Progresse of the Gospel amongst the Indians in New-England . . .* (London, 1659), 29 ("Mittachonq"); Cotton Mather, *Wussukwhonk En Christianeue asuh peantamwae Indianog; Wahteauwaheonaount Teanteaquassinish, Nish Englishmansog Kodtantamwog Indianog Wahteaunate kah Ussenate, En michemohtae Wunniyeuonganit* [*An Epistle to the Christian Indians, Giving them a Short Account, of what the English Desire them to Know and to Do, In order to their Happiness*] ([Boston], 1706), 4 ("negonne kuhquttum").

To examine native language terms in Eliot's writings, I use Trumbull, *Natick Dictionary*. For other texts, I depend on Goddard and Bragdon, *Native Writings in Massachusett*, vol. 2. This analysis draws vocabulary from a fifty-year span of native language texts, recognizing the need for a study of the evolution of Massachusett and Wampanoag religious terminology.

For several years now, scholars of Latin America, particularly Mesoamerica, have sought insights to native Christianity by analyzing native language texts, using methods far more systematic than the ones employed here. See, for example, Louise M. Burkhart, *The Slippery Earth: Nahua-Christian Moral Dialogue in Sixteenth-Century Mexico* (Tucson, Ariz., 1989). Overviews of this literature include Stafford Poole, "Some Observations on Mission Methods and Native Reactions in Sixteenth-Century New Spain," *Americas* 50, no. 3 (January 1994): 337–49; Matthew Restall, "A History of the New Philology and the New Philology in History," *Latin American Research Review* 38, no. 1 (February 2003): 113–34.

the moon under her feet, and upon her head a crown of twelve stars: And she being with child cried, travailing in birth, and pained to be delivered." This passage seemed to contradict the Indians' stigma against women succumbing to the agony of childbirth.[26] Unfortunately, Cotton did not record his answers, but the Wampanoags had given him an opportunity to expound on faith and works, individual and collective judgment, earthly and heavenly rewards, and biblical authority, issues that rested at the heart of Christianity.

The more frequent these exchanges, the more sophisticated the Wampanoags' questions became. Cotton's charges demanded: "What is true Conversion?"; "Whether all th[at] xt [Christ] calles, come to him?"; "How comes the heart to be assured of h[im] & what are the parts of this Assurance?"; "What doth the soule doe to open the doore to xt?"; "Seeing God rewards a sinner with [de]ath for his evill actions, why doth he not reward him with a good [re]ward for any good actions?" Should one literally interpret Matthew 5:29, which reads, "if thy right eye offend thee, pluck it out?"; "Why Judas betraying [Christ] was a sin seeing God had appointed it?" And "what may a man have in his heart to fit him to receive the Lord's supper?" Some Wampanoags brought sectarian perspectives to these issues, having been exposed to Anabaptists and Quakers before Thomas Mayhew Sr. could drum them off the island, and perhaps to members of unorthodox churches located throughout the colonies of New Plymouth and Rhode Island. One can almost see Cotton's teeth clench as the Wampanoags asked, "why children are baptised? If that wash [them] from sin, why doe they sin any of them when growne up?" Others challenged the New England Puritans' controversial requirement of conversion narratives for full church membership by asking, "why all belevers are not Baptized . . . & what shall they injoy in the church?" John Hiacoomes wanted to know, doubtlessly after meeting with Seventh-Day Baptists, why the Sabbath had been moved from the Hebrew Saturday to Sunday. Joshua of Chappaquiddick cited Matthew 24:24 to ask if false prophets could deceive God's elect. Mittark cut to the quick and demanded, "How many sorts of faith are there?"[27] These Wampanoags were not blank pages waiting

[26] Travers, *PMHS* 109: 65–66, 68, 71, 74, 79, 82, 86–87. For an illuminating analysis of Indian questions in the Eliot mission, see Naeher, *NEQ* 62: 351–55. Ann Marie Plane, "Childbirth Practices among Native American Women of New England and Canada, 1600–1800," in *Medicine and Healing*, ed. Peter Benes, The Dublin Seminar for New England Folklife (Boston, 1992), 1–12.

[27] Travers, *PMHS* 109: 63–65, 68, 71–72, 74–76, 79, 84. See also Whitfield, *Light appearing*, 135–37. George Bishop, *New-England Judged, By the spirit of the Lord* (London, 1661), 123; Gookin, *CMHS* 1: 123, 203; Mayhew, *Indian Converts*, 49. William G. McLoughlin, *Soul Liberty: The Baptists' Struggle in New England, 1630–1833* (Hanover, N.H., 1991), 5, 21–22; George D. Langdon Jr., *Pilgrim Colony: A History of New Plymouth, 1620–1691* (New Haven, Conn., 1966), 70. Generally on dissenters in New England, see Philip F. Gura, *A Glimpse of Sion's Glory: Puritan*

to be filled by their missionaries with absolute Christian truths. They sought out dissenting opinions and probed the faith's gray areas and contradictions, whether their missionaries liked it or not.

For all their impressive gains, the Wampanoags struggled mightily with the idea of sin, the acceptance of which some scholars use as a gauge of conversion.[28] Traditionally, Wampanoags believed that spirits might punish individuals and perhaps even groups for their offenses, but they shared nothing of the Puritan idea of corruption passed down from the time of origins, tainting even humankind's best deeds, and condemning everyone who did not open his or her heart to a selectively granted divine dispensation to eternal torture. Literal translation had no answer for this conceptual rift, leading Brainerd to conclude, "*'tis next to impossible to bring them to a rational Conviction that they are Sinners by Nature*, and that their *Hearts are corrupt and sinful* . . . they seem as if they thought 'twas only the *Actions* that were sinful, and not their *Hearts*." Most missionaries used matchit, the word for bad, as a root for ungodly ("match-tukeg"), sin ("matchuk"), and sinners ("matches-secheg"). These terms failed to distinguish between, on the one hand, permanent badness in the sense of a fallen humankind and, on the other, badness stemming from an isolated act or an individual tendency toward bad acts, which from a Puritan's perspective would have missed the point. Not surprisingly, then, Wampanoags struggled to grasp the notion of limited human means, a pattern Charles L. Cohen has also identified in the Natick Indians' first conversion narratives. John Kossunnut asked Cotton "whether man had power to convert himselfe," confused by the jousting ideas of God's omnipotence and his followers' responsibility to prepare themselves for grace. Another unnamed Wampanoag wanted to know "what comes

Radicalism in New England, 1620–1660 (Middletown, Conn., 1984); Carla Gardina Pestana, *Quakers and Baptists in Colonial Massachusetts* (New York, 1991); Jonathan M. Chu, *Neighbors, Friends, or Madmen: The Puritan Adjustment to Quakerism in Seventeenth-Century Massachusetts Bay* (Westport, Conn., 1985).

[28] David Murray, "Spreading the Word: Missionaries, Conversation and Circulation in the Northeast," in Griffiths and Cervantes, *Spiritual Encounters*, 47; Van Lonkhuyzen, *NEQ* 63: 417. For discussions of how to define conversion, see David A. Snow and Richard Machalek, "The Sociology of Conversion," *Annual Review of Sociology* 10 (1984): 167–90; Nicholas Griffiths, introduction to Griffiths and Cervantes, *Spiritual Encounters*, 2–14; and the following chapters in Robert W. Hefner, ed., *Conversion to Christianity: Historical and Anthropological Perspectives on a Great Transformation* (Berkeley, Calif., 1993): Hefner, "Introduction: World Building and the Rationality of Conversion," 3–46; Hefner, "Of Faith and Commitment: Christian Conversion in Muslim Java," 99–125; William L. Merrill, "Conversion and Colonialism in Northern Mexico: The Tarahumara Response to the Jesuit Mission Program, 1601–1767," 129–63. Strong arguments against use of the term can be found in Neal Salisbury, "Embracing Ambiguity: Native Peoples and Christianity in Seventeenth-Century North America," *Ethnohistory* 50, no. 2 (Spring 2003): 247–59; Morrison, *Solidarity of Kin*, 147–72.

betweene [a] state of sin & a state of grace," and the sachem Wompamog demanded, "Why god commands sinners to turne from their evill wayes, seeing they have noe strength of their owne to turne?" Answers would have come automatically to most English Congregationalists, though they had their doubters too.[29]

Most Wampanoags struggled with the idea of sin for some time, yet as they sat through one meeting after another listening to the missionaries address their questions, they began to cross this widest of cultural gaps. In the early 1650s, Thomas Mayhew Jr. and Momonaquem traveled to the mainland to preach and take the Lord's Supper with the praying Indians of Natick, and during a pause the Wampanoag took some time to discuss his spiritual beliefs with several colonists, including William French. According to French, Momonaquem understood sin as "a continuall sicknesse in my heart" as well as "a breach of all God[']s Commandements," that could only be overcome "by the satisfaction of Christ," a realization that came to him after God "stripped mee as bare as my skinne." Momonaquem was not alone in his orthodoxy. In 1659 a handful of Vineyard Wampanoags rose before a mixed audience of Indians and Englishmen to publicly narrate the evolution of their faith that Christ died for them—the essential act for becoming a full member of many Congregationalist churches. Convinced of the sound doctrine and grace in these relations, the baptized colonists recognized the orators as visible saints and their meeting as a gathered church possessing equal standing to English congregations. Eleven years later Eliot and Cotton traveled to the Vineyard to usher in Hiacoomes and John Tackanash as the first ordained Indian pastor and teacher, respectively, in North America, and John Nahnoso and Joshua Momatchegin as ruling elders.[30] No record survives of what the Indians said that day, but biographies of their contemporaries, written in the early eighteenth century by Experience Mayhew based on notes left by his missionary predecessors, are suggestive. John Shohkow of

[29] Brainerd, *Mirabilia Dei inter Indicos*, 232; for uses of matchit, see Trumbull, *Natick Dictionary*; Pierson, *Some Helps for the Indians*, 27; "Indian Grammar," Experience Mayhew Papers, Massachusetts Historical Society, Boston, Mass.; Cohen, "Conversion among Puritans and Amerindians"; Travers, *PMHS* 109: 62, 63–64, 68. For English Congregationalists, see, for instance, Michael P. Winship, *Making Heretics: Militant Protestantism and Free Grace in Massachusetts, 1636–1641* (Princeton, N.J., 2002).

[30] Whitfield, *Strength out of Weaknesse*, 176–77 (quotations, 192–93); Gookin, *CMHS* 1: 204–5; John Eliot, *A Brief Narrative of the Progress of the Gospel Amongst the Indians in New-England, in the Year 1670* (1671; repr., Boston, 1868), 20–21; [John Eliot], "Eliot's account of indian churches in New-England, 1673," in *CMHS*, 1st. ser., 10 (1809): 124, 126; Increase Mather, *A Letter Concerning the Success of the Gospel amongst the Indians in New-England*, appendix to Mayhew, *Conquests and Triumphs*, 66; Mayhew, *Indian Converts*, 10, 14, 34; Prince, *Some Account of those English Ministers*, 300. Mather, *Magnalia Christi Americana*, 1: 567, 569, incorrectly dates the ordination as 1666.

Nunnepog reportedly expressed that "tho his Sins had been many and great, yet he had Hopes that thro' the Mercy of God, and the Merits of his Son Jesus Christ, he should obtain Life eternal." Japheth Hannit acknowledged that he needed God's assistance to resist temptation. Hannah Nohnosso called herself "a very filthy Creature; yet Jesus Christ my only Redeemer can, if he pleaseth, save me from my Sins." By 1678 more than forty Wampanoags had made public confessions to the same effect and become members of the Vineyard's two full-fledged Indian congregations. Many others would have joined them, but the Wampanoags, having taken over the governance of their own churches, continued to require conversion narratives for membership well into the eighteenth century though many English congregations had already relaxed this standard. Ironically enough, Indians had become standard-bearers for one of the defining features of New England Puritanism.[31]

The Wampanoags' leading lights had proven that they belonged in the Congregationalist fold, but because they carried their entire communities with them rather than formed segregated Christian reserves, their churches contained room for the tepid, unorthodox, and even profane. Some Wampanoags avoided complex theological issues such as the Trinity, claiming these mysteries were "too deep for us to understand." Others refused to send their children to school, neglected family prayer, or persisted in sin, and yet called on God when in trouble. One powwow tried to hedge his bets by encouraging his wife to adopt Christianity though he maintained his old manitous. Massachusetts superintendent of Indian affairs Daniel Gookin believed that though the praying Indians generally "do fear God and are true believers," others were "hypocrites, that profess religion, and yet are not sound hearted." Even Thomas Mayhew Sr. could not help but belie his own suspicions when he wrote to John Winthrop Jr., "I doe speake to them sometimes about an howre. I ask sometimes where they understand; they say yes; and I know they doe, for in generall I really know they understand me, but sometimes I doubt my sellfe, & then I ask." There were and would continue to be people like the mother of

[31] Mayhew, *Indian Converts*, 30, 49, 90, 117, 166, 206; Thomas Mayhew to the Governor of Connecticut and Commissioners of the United Colonies, Sept. 24, 1678, in *Records of the Colony of New Plymouth in New England . . . 1653–1679*, ed. David Pulsifer (Boston, 1859), 10: 404–6; Ford, *Some Correspondence*, 86; Letter of Josiah Torrey in [C. Mather], *Letter, about the present state of Christianity, among the Christianized Indians of New-England* (Boston, 1705), 9; [C. Mather], *Concerning the Essays that are made, for the Propagation of Religion among the Indians, in the Massachuset-Province of New-England*, appendix to Mather, *Bonifacius: An Essay Upon the Good, that is to be Devised and Designed, by Those Who Desire to Answer the Great End of Life, and to do Good While They Live* (Boston, 1710), 198; [Cotton Mather], *A Brief Account of the Evangelical Work among the Christianized Indians of New-England*, appendix to Mather, *Just Commemorations: The Death of Good Men, Considered* (Boston, [1715]), 51–52.

Job Soomanan who "was by some [Indians] thought to be a Heathen, yet she owned the true God, and did sometimes call upon him"; but this did not make her much different from English "'horse-shed' Christians," as David D. Hall calls them, who professed Christianity and held to many of its tenets but dabbled in the occult in private. Recognizing that there was a range of devotion in any Christian population and that faith was a deeply personal and invisible quality, Mayhew Sr. admitted that the sincerity of converts was simply impossible to determine absolutely.[32]

Only individuals can know their own hearts, but the Wampanoags left compelling evidence of a sincere commitment by promoting the faith among their own kind. Their reform of death ways sanctioned by tradition and taboo are especially telling. Responding in the 1650s to Mayhew's argument that Christians were supposed to resign fate to God's will, Christian Indians in mourning ceased blackening their faces, mangling their clothes and hair, and screeching: customs designed to provide emotional release and frighten the deceased's spirit toward the afterlife.[33] Archaeological studies show that during the next few decades they made a number of equally dramatic adjustments to their treatment of the dead. Instead of burying corpses in the fetal position and covering them in red ochre to symbolize rebirth into Kiehtan's house, they shifted to extended burials with coffins, headstones, and footstones, like the English.[34] Since

[32] Mayhew, *Indian Converts*, 265 ("too deep"), 113, 110 ("a Heathen"); Mayhew, *Conquests and Triumphs*, 18–19; Gookin, *CMHS* 1: 183, 205; Thomas Mayhew to John Winthrop Jr., Aug. 29, 1659, in *CMHS*, 4th ser., 7 (1865): 37. On horse-shed Christians, see David D. Hall, *Worlds of Wonder, Days of Judgment: Popular Religious Belief in Early New England* (New York, 1989), 243.

[33] Whitfield, *Light appearing*, 116; Gookin, *CMHS* 1: 153. See also Thomas Shepard, *The Clear Sun-shine of the Gospel Breaking forth upon the Indians in New-England* (London, 1648), in *CMHS*, 3d ser., 4 (1834), 65.

[34] The following discussion draws on Susan G. Gibson, ed., *Burr's Hill: A 17th Century Wampanoag Burial Ground in Warren, Rhode Island* ([Providence, R.I.], 1980), 13; William B. Taylor, "The Taylor Farm Site," *Bulletin of the Massachusetts Archaeological Society* 43, no. 2 (October 1982): 40–46; Preliminary Site Reports of Cedar Tree Neck, Chilmark, and Gay Head sponsored by the Massachusetts Historical Commission (courtesy of Jill Bouck, Martha's Vineyard Historical Society); Elizabeth A. Little, "The Nantucket Indian Sickness," in *Papers of the Twenty-first Algonquian Conference*, ed. William Cowan (Ottawa, Canada, 1990), 181; James Axtell, "Last Rites: The Acculturation of Native Funerals in Colonial North America," in Axtell, *The European and the Indian: Essays in the Ethnohistory of Colonial North America* (New York, 1981), 119, 123–27; Brenda J. Baker, "Pilgrim's Progress and Praying Indians: The Biocultural Consequences of Contact in Southern New England," in *In the Wake of Contact: Biological Responses to Conquest*, ed. Clark Spencer Larsen and George R. Milner (New York, 1994), 39. For a thorough discussion of Narragansett burial practices in the late seventeenth century, see Patricia E. Rubertone, *Grave Undertakings: An Archaeology of Roger Williams and the Narragansett Indians* (Washington, D.C., 2002), 132–64, 191–98.

funerals took place within the confines of Indian villages and, one might assume, often beyond colonial supervision, it appears these reforms were Wampanoag initiatives to symbolize their Christianity. Not surprisingly, then, Christian Wampanoag burials, no less than Christian Wampanoag religious beliefs, did not expunge traditional forms and meanings. Grave goods designed for the spirit's use in the hereafter, such as kaolin pipes, metal pots, glass bottles, and shell beads, continued to find their way into coffins. People still avoided mentioning the names of the deceased, using circumlocutions such as "nickanoose his father" (Nickanoose's father) to leave their ghosts undisturbed. They continued to point their graves westward toward Kiethtan's house, a practice based on the idea that the soul exited the body through the skull and should begin its journey to the afterlife traveling in the proper direction. The Indians no longer colored their corpses red, but during the nineteenth century one observer noted that Gay Head Indians buried their dead in coffins stained with red clay; in this sense, Wampanoag tradition had indeed gone underground. Moreover, though Wampanoag Christians referred to the spirits of the afterworld as angels and devils, they still received death's notice from an illuminated blur like Cheepi, and their souls left their host bodies for the afterworld in flashes of light no less than the traditional Cowwéwonck souls. Wampanoag-speaking angels and the ghosts of relatives contacted people through dreams to reassure them of their salvation or portend future events.[35] At once Christian and distinctly Wampanoag, these death ways paralleled the Vineyard Indians' religious beliefs.

The Wampanoags' public campaign against sin would appear to represent a more complete acceptance of the colonists' brand of Christianity, since it involved an entirely new bureaucracy created to suppress such previously tolerated conduct as premarital sex, polygamy, Sabbath breaking, powwowing, and a host of other customary behaviors. In 1670 John Nahnoso and Joshua Momatchegin were ordained as ruling elders, and the Indians called them "aiusk-omua-eni-nuog," which Experience Mayhew understood to mean "Reprovers, or Men of Reproofs, because they judge that their Office mainly consists in reproving of Sinners and censuring Offenders." These elders ushered sinners before the congregation to confess and repent and issued penalties such as exclusion from the Lord's Supper when the sinners resisted. A year later, in 1671, the Wampanoags decided to back up the elders with muscle by appointing magistrates to charge egregious sinners before courts

[35] Elizabeth A. Little, "Three Kinds of Indian Land Deeds at Nantucket, Massachusetts," in *Papers of the Eleventh Algonquian Conference*, ed. William Cowan (Ottawa, Canada, 1980), 65; Edward S. Burgess, "The Old South Road of Gay Head; or, Musings on Discontinued Byways," *Dukes County Intelligencer* 12, no. 1 (1970): 24 (coffins); Mayhew, *Indian Converts*, 33, 147–48, 150, 160, 201, 221–22, 232, 262; Simmons, *Spirit of the New England Tribes*, 116, 120–21, 134, 137.

of the sachems and their counselors. Magistrate William Lay (or William Panunnut) would approach evildoers as if he were a church elder, "to convince their Consciences of the Sins of which they were guilty, and bring them to a humble sense and Confession of their Faults . . . but if they appeared stubborn and obstinate, he would very severely chastise them for their Offences, making them known what *Stripes for the Backs of Fools* do intend." Lay answered critics of his harsh love that his people "[had] no more shame in them." The Wampanoags' crackdown on several traditionally permissible activities that, apart from incurring God's wrath, had little effect on other people, suggests that some of them had accepted the colonists' providentialism in which God rewarded or punished corporate morality.[36]

Church and court officers were new, as was the punishment of behaviors now labeled sinful, yet the men who filled these positions came disproportionately from the Wampanoags' leading families. At least six of nine known Indian magistrates from the late seventeenth century held the status of sachem, or were a sachem's relative or a sachem's counselor, and of thirty church officials (ministers, preachers, deacons, and teachers), a minimum of sixteen were of elite descent. Similarly, church figures dominated the Wampanoags' political ranks. Not only were the Vineyard sachems Mittark, Wompamog, and Tawanquatuck leading Christians, but in 1675 nine of Mittark's ten counselors held church positions. And in these joint capacities they continued to fulfill most of the elite's customary functions, such as treating community visitors to hospitality, caring for the poor and needy, hosting feasts, and arbitrating disputes. The appropriation of new titles by old leaders had made the Wampanoags' political, court, and church offices all but indistinguishable, not unlike their Christian and traditional religious beliefs.[37]

[36] During one meeting the praying Indians asked Hiacoomes "to reckon up their sins unto them; he presently found 45. or 50." See Whitfield, *Light appearing*, 112 (quotation, 115). On civil laws in mainland praying Indian communities, see Axtell, *Invasion Within*, 142. Eliot, *Brief Narrative*, 20–21; Eliot, *CMHS* 10: 124, 126; Gookin, *CMHS* 1: 205; Mather, *Letter Concerning the Success*, 66; Mayhew, *Indian Converts*, 10, 14, 34, 17 ("Reprovers"); Prince, *Some Account of those English Ministers*, 300.

Mayhew, *Indian Converts*, esp. 61, also 16–18, 41, 50, 57, 61, 97; [Experience Mayhew], "A Brief Account of the State of the Indians on Martha's Vineyard . . . 1694 to 1720," appended to Mayhew, *A Discourse Shewing that God Dealeth with Men as with Reasonable Creatures* (Boston, 1720), 5–6; Bragdon, "Native Christianity in 18th Century Massachusetts," 119; Prince, *Some Account of those English Ministers*, 293–94; Kathleen Joan Bragdon, "Crime and Punishment among the Indians of Massachusetts, 1675–1750," *Ethnohistory* 28, no. 1 (Winter 1981): 24; Mayhew, *Indian Converts*, 26–27, 48, 89, 93–94, 99, 25–26 ("convince their Consciences"); Christopher Grasso, *A Speaking Aristocracy: Transforming Public Discourse in Eighteenth-Century Connecticut* (Chapel Hill, N.C., 1999), 24–85, esp. 30.

[37] The melding of Indian church and political hierarchies is a trademark of mission history. For example, see Steven W. Hackel, "The Staff of Leadership: Indian Authority in the Missions of Alta California," *WMQ* 54, no. 2 (April 1997): 347–76.

Such continuity resonated with the common Wampanoag argument that Christianity was less a new faith brought by the English than a colonist-spurred revival of ancient Indian ways. One Wampanoag on Cape Cod explained, "as [to] the Commandements of God, and concerning God, and the making of the world by one God, that they had heard some old men who were now dead, to say the same things." The Indians, however, had fallen into a "great sleep" and forgotten these truths. Christianity, by this train of thought, was a return to tradition, not an abandonment of it. For others the spread of Christianity was a fulfillment of precolonial prophecy. A mainland Wampanoag recalled that during the epidemic of 1616–19:

> Hee fell into a dream, in which he did think he saw a great many men come to those parts in cloths, just as the *English* now are apparelled, and among them there arose up a man all in black, with a thing in his hand which hee now sees was all one *English* mans book; this black man he said stood upon a higher place than all the rest, and on the one side of him were the *English*, on the other a great number of *Indians*: this man told all the *Indians* that God was *moosquantum* or angry with them, and that he would kill them for their sinnes, whereupon he said himself stood up, and desired to know of the black man what God would do with him and his *Squaw* and *Papooses*, but the black man would not answer him a first time, nor yet a second time, untill he desired the third time, and then he smil'd upon him, and told him that he and his *Papooses* should be safe, and that God would give unto them *Mitcheu*, (*i.e*) victualls and other good things, and so hee awakened.

Well into the eighteenth century, Vineyard Wampanoags told of the miraculous birth of their Christian leader Japheth Hannit, who survived only because his mother received a blessing from Jehovah and dedicated her baby to serve him—an event that occurred years before English settlement on the island and the onset of the Mayhew mission.[38] No Wampanoag would have denied that a Christian life required many changes. Yet the fullest account of the faith, according to these visions, was that Christianity was a return to the purity of old ways and a rediscovery of spiritual power.

Flush with religious enthusiasm, Hiacoomes, Momonaquem, Wompamog, Pamehanit, and numerous other Wampanoags spread the news about how to obtain ancient sacred power through new forms; they,

[38] Shepard, *Clear Sun-shine*, 43–44. Wuttununohkomkoo's and Japheth Hannit's stories can be found in Mather, *Magnalia Christi Americana*, 2: 440–42; Mayhew, *Indian Converts*, 44–45, 129, 135–36.

not the Mayhews or Cotton, were the most active missionaries on the island. Perhaps the most dramatic commitment came from the Aquinnah sachem Mittark, who suffered three years of banishment to the other side of the island for his support of the mission, only to make a triumphant return after convincing several of Aquinnah's leading residents to join the meeting. Other Vineyard Wampanoags traveled deeper into the missionary field. By 1673 their efforts, combined with the Mayhews', were largely responsible for spreading Christianity to ninety Nantucket Indian families. On the mainland colonist Richard Bourne preached to the Wampanoags of Cape Cod, native John Sassamon proselytized in Wampanoag settlements around Assawompsett Pond, and John Cotton Jr. made occasional visits to Acushnet and Saconnet, a stone's throw from the Wampanoag seat at Pokanoket. Such evangelical work led half or more of the Wampanoag people to become worshipping Christians before 1675. Their commitment to enforcing Christian principles and living peacefully with the English encouraged them to turn to their congregations and courts rather than to the unchurched paramount Wampanoag sachem, Philip, to mediate their disputes. In all likelihood they also halted their tribute payments to Philip, which would make one of his casus belli—that he had "a great fear to have ani of ther indians should be Caled or forsed to be Christian indians" because "the English made them not subject to ther kings"—even more serious than historians have appreciated.[39] Yet Philip's war against the English only served to alienate the praying Indians further from him, with those on Cape Cod and the islands either fighting alongside the English or remaining neutral, and to accelerate his people's Christianization. After his defeat a half dozen Vineyard Indians joined with John Cotton Jr. to promote Christianity among mainland Wampanoags who had received quarter from Plymouth late in the war in exchange for switching sides. The mainlanders could plainly see that the Vineyard had

[39] Whitfield, *Light appearing*, 118; Whitfield, *Strength out of Weaknesse*, 188; Mayhew, *Indian Converts*, 13, 20–22, 46–47, 73–74, 129; Mayhew, *Conquests and Triumphs*, 37, 47–48; Pulsifer, *Records of the Colony of New Plymouth*, 10: 383–84; Gookin, *CMHS* 1: 196–207; "Letter from Rev. John Eliot, 1664," *New England Historical and Genealogical Register* 9, no. 2 (April 1855): 131; Eliot, *Brief Narrative*, 21; Eliot, *CMHS* 10: 124–29; Travers, *PMHS* 109: 93, 94.

For more on Bourne, see Mary Farwell Ayer, "Richard Bourne, Missionary to the Mashpee Indians," *New England Historical and Genealogical Register* 62, no. 2 (April 1908): 139–43; Francis G. Hutchins, *Mashpee: The Story of Cape Cod's Indian Town* (West Franklin, N.H., 1979), 35–38, 40–43, 45–46; Jack Campisi, *The Mashpee Indians: Tribe on Trial* (Syracuse, N.Y., 1991), 77–79. On Sassamon, see James P. Ronda and Jeanne Ronda, "The Death of John Sassamon: An Exploration in Writing New England Indian History," *American Indian Quarterly* 1, no. 2 (Summer 1974): 91–102; and Lepore, *Name of War*, 21–47. John Easton, "A Relacion of the Indyan Warre, by Mr. Easton, of Roade Isld., 1675," in *Narratives of the Indian Wars, 1675–1699*, ed. Charles H. Lincoln (New York, 1913), 10–11 ("a great fear").

been spared disease ever since the first praying Indians gathered in 1645 and that Christianity had enabled island Wampanoags, though they shared many of Philip's grievances, to keep the peace with local colonists. By contrast Philip's allies had resisted Christianity for years and most of them were dead or scattered by disease, starvation, and war. This comparison made taking up Christianity the only sensible choice. By the late seventeenth century, Wampanoags living north of Buzzard's Bay had organized into four Christian meetings run by Indian officers ordained by their Vineyard counterparts.[40] Christianity had become the Wampanoags' common religion.

Though no contemporary accounts of Wampanoag evangelical work survive, a transcript of a chance conversation in 1708 between New York Governor Lovelace and an unnamed Wampanoag from the mainland town of Dartmouth hints at the natives' approach. Lovelace was interested in this Indian's Christian knowledge, so he began quizzing him catechism-style. The native formulated answers (recorded in the vernacular) using his hand as a mnemonic device, a common Indian practice. The Wampanoag responded to Lovelace's question about the Trinity as follows: "He is one God (pointing to the Palm of his Hand.) and yett he Dree (pointing to his Three extended Fingers on that Hand.)—what you callum, my Lord—methink, you calum, Dree Person." On the issue of whether all people were condemned to hellfire, the Indian responded:

> Maybe no! . . . You see my-Lord! (Extending Three Fingers & pointing to his middle Finger,) He speakum Him (pointing then to his For-finger,) You so big Angry with Man. Me Luvum Man. What me do you no Angry[?] Then He (pointing to his Fore-finger,) speakum Him (so pointing to his middle Finger,) You go down; You be man; you do all Good Things for man who can do nune. You Dy, that man no Dy. Then you rise again. Then you come up here. Then you show man how to com here; You Lead Man here.

Lovelace was astounded to learn that, though John Cotton Jr. often preached nearby, this Indian's instruction had come from other natives: the Vineyard Wampanoags.[41]

[40] Grindal Rawson and Samuel Danforth, "Account of an Indian Visitation, A.D. 1698," in *CMHS*, 1st ser., 10 (1809), 130, 134; Mayhew, *Indian Converts*, 38, 87, 110, 140, 161; Mayhew, *Conquests and Triumphs*, 37; Letter of Thomas Hinckley, Apr. 2, 1685 (transcript), File 5, New England Company Collection, American Antiquarian Society; John Cotton Jr. to Increase Mather, Mar. 23, 1693, Howard Gotlieb Archival Research Center, Boston University, Boston, Mass.; Travers, *PMHS* 109: 98–101; Mather, *Letter, about present state of Christianity*, 13; Mather, *Brief Account of the Evangelical Work*, 53; Mather, *Concerning the Essays*, 195–99.

[41] "A Conference with an Indian of New England, Dec. 1708," New England Company Ms. no. 7957, p. 3, Guildhall Library, Corporation of London. See also Laura J. Murray, "Joining Signs with Words: Missionaries, Metaphors, and the Massachusett Language," *NEQ* 74, no. 1 (March 2001): 62–93; Shepard, *Clear Sun-shine*, 46.

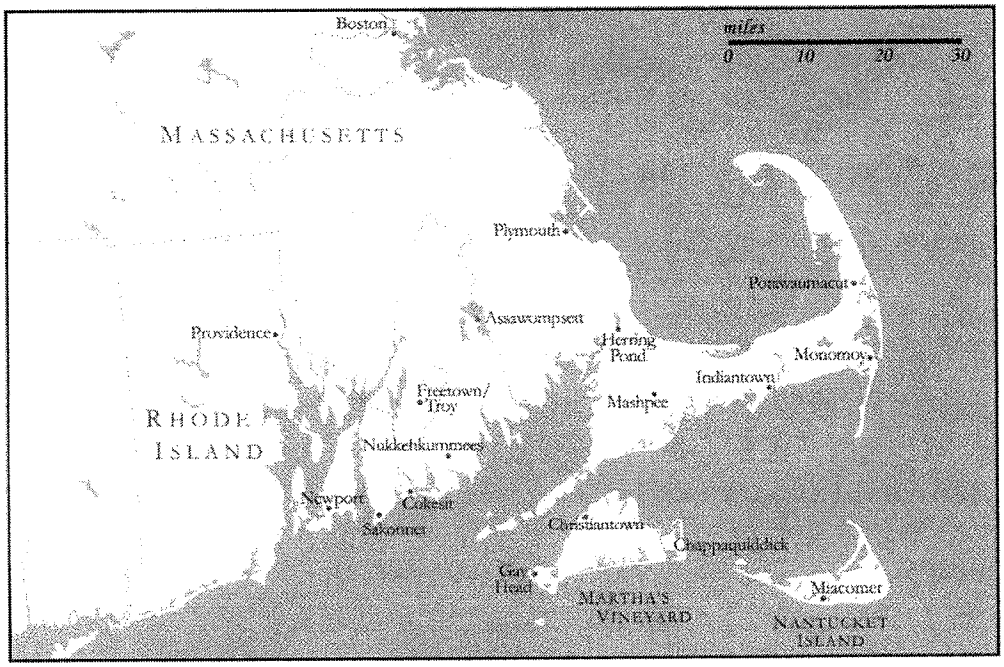

FIGURE II

Wampanoag Christian communities after King Philip's War. Drawn by Rebecca L. Wrenn.

In 1792 Thomas Cooper, a sixty-year-old Wampanoag from Aquinnah, told Benjamin Basset, a selectman from the Vineyard town of Chilmark, an oral tradition about how his people warded off yellow fever (a postcontact disease) "before the English came among the Indians": "After it had raged and swept off a number," Cooper explained, healthy people would gather to conduct a two-part ritual. First, the rich would form a circle and throw into the air miniatures representing their most valued possessions for the poor to seize as claims to that wealth. Next, the community would place the "most sprightly young man in the assembly" in a new wigwam, and then set the structure ablaze while the people outside sang and danced in two columns. "The youth would leap out of the flames, and fall down to appearance dead," Cooper continued. "Him they committed to the care of five virgins." Eventually the boy would awaken and recount a trance in which he traveled high up into the air "where he came to a great company of white people, with whom he had interceded hard to have the distemper layed; and generally after much persuasion, would obtain a promise, or answer of peace, which never failed of laying the distemper."[42]

Basset intended this story to be read as a quaint curiosity from New England's supposedly disappearing Indian remnant, but for Wampanoag

[42] Benjamin Basset, "Fabulous Traditions and Customs of the Indians of Martha's Vineyard," in *CMHS*, 1st ser., 1 (1792): 139–40.

audiences it contained powerful lessons about values and spiritual relationships that stretched back from the present to at least the early 1600s. With the Indians under intense pressure to divide their common lands and enter the individualistic competition of Yankee society, this oral tradition reinforced the ethic of sharing wealth with the ill and needy as a means to ease their suffering and to alleviate social tensions (symbolized by exclusion of the poor from the circle) that produced witchcraft, sickness, and community dissolution. It drew on ancient Indian motifs, such as renewal by fire, *communitas* by dance, and truth by vision. Not least of all, it acknowledged the historical connections among Wampanoag Christianity, prophesy, disease, and colonialism, in which precontact Wampanoag visions told that newcomers would possess the spiritual keys to future health and peace. Adoption of Christianity, in other words, made sense from a traditional Wampanoag perspective.

It is entirely possible that Cooper related this story to Basset in the shadow of the Gay Head church, which had been a part of the Aquinnah Wampanoags' community since the days of Mittark and had long served as a repository for the people's most cherished traditions. Initially, most Wampanoags came to Christianity largely, if not solely, in search of protection from disease, but once inside the fold, English and Wampanoag missionaries gave them a comprehensive education in the new religion. The Indians' goal was to learn how to ally with the Christian God and they sustained their effort because it produced clear benefits: most prominently, from the first Christian meeting in 1645 to the year 1690 not a single epidemic afflicted the island. By the time another one appeared, Christianity was already such a part of Wampanoag life that the Indian response was either to blame sin or sink into apathy but not to revive ancestral rites. On his deathbed in 1712, preacher Japheth Hannit wrote a stinging admonishment to his demoralized followers: "You bring Trouble on the People . . . by your Miscarriages. They procure Distempers & all other Chastisement from the Great God . . . God hath repeated his Chastisements upon us especially by Sickness . . . Yet only how full are all our Towns of Sin!" Marginalia from a native language Bible that circulated through the Wampanoag community during the early to mid-eighteenth century contains lines such as "I am a pitiful person . . . we are foolish"; "I am not able to defend myself from the happenings to the world"; "Forever is a person blessed who believes in God"; "We have disease in the whole world, because we do not"—and the entry suddenly ends there.[43] It might have taken the Wampanoags some time, but by this period they were all too aware of the meaning of sin, perhaps better than many of their English neighbors.

[43] Mayhew, *Indian Converts*, 68, 86; Mayhew, *Conquests and Triumphs*, 34; Suffolk Files no. 43637, p. 81, Massachusetts State Archives, Boston, Mass.; New

The Wampanoags were Christians by any reasonable standard, yet they did not convert, as missionaries and many of their historians have used the word, by suddenly making a blanket rejection of ancestral identity, beliefs, and practices, to be replaced by Christian substitutes. Instead, through a process of religious translation, they and their missionaries associated Christian spirits with ancient ones, used familiar Wampanoag terms to express novel Christian doctrines, and placed longstanding elites in church offices. Indeed, some Wampanoags understood Christianity as an epiphany bringing clarity to the ancestors' teachings. The combined effect of spiritual revival, social restructuring around Christian institutions, and strengthened ties with the English was to quicken disease-ravaged Wampanoag communities, the locus of Indian lives. In these ways and more, Wampanoag Christianity was traditional. Yet the Wampanoags also embraced many of Christianity's novelties. They allied with a sky god of unmatched power who placed unprecedented demands on his followers and whose omnipotence challenged basic Wampanoag understandings of cosmology and causality. Fearful of this god's wrath—not only for active sins, but for an "evill heart"—the Indians established churches and courts to punish misdeeds and awaken sinners to their corruption. They asserted a new Christian public identity by adopting colonial burial forms and establishing Sunday meeting as the people's religious gathering, among many such changes. Even Puritan leaders known for their skepticism toward appearances conceded that Wampanoag communities had become Christian and probably contained some of God's saints, a radical departure from their assessment of other native peoples as savages.[44] Little did most of them know that even as the Wampanoags had become Christians in fundamental ways, the faith was now the Indians' own.

In many ways the mission of Martha's Vineyard was unique among its colonial peers. Unlike the Franciscans in Spanish Florida or New Mexico, the Mayhews were not backed by troops with a track record of brutally suppressing Indian resistance and of propping up cooperative leaders. Unlike the Jesuits of New France, they could not entice Indians with substantial trade benefits, military protection, or diplomatic favors.

England Company Ms. no. 7957, p. 9; Goddard and Bragdon, *Native Writings in Massachusett*, 1: 429, 431, 437, 443.

[44] John Eliot, *A Late and Further Manifestation of the Progress of the Gospel amongst the Indians in New England . . .*, in *CMHS*, 3d ser., 4 (1834): 279; Cotton Mather, *The Triumphs of the Reformed Religion, in America. The Life of the Renowned John Eliot* (Boston, 1691), 116–22; Mather, *Bonifacius*, 195; Samuel Sewall, *Phænomena Quædam Apocalyptica Ad Aspectum Novi Orbis configurata; or, Some Few Lines Towards a Description of the New Heaven as it Makes to Those who Stand upon the New Earth* (Boston, 1697), 34; Increase Mather, *Masukkenukeeg Matcheseaenvog* [Greatest Sinners Exhorted] (Boston, 1698), 163–64; Rawson and Danforth, *CMHS* 10: 129–34.

Nevertheless, all missionaries, whatever their local circumstances, faced the challenge of translating Christianity to native people across a broad gulf of culture and language. All of them would have preferred for the Indians to obliterate their former selves and adopt European models of living, thinking, and worshipping wholesale. But the Indians would not abide by this agenda, not in Vineyard praying towns, Spanish *reducciones*, French *reserves*, or anywhere else. It was neither possible nor, from the natives' perspective, desirable to do so. Indians were going to invest Christianity with certain traditional meanings and functions or else have little or nothing to do with it, as recent historians of other colonial regions, particularly Catholic ones, have recognized to a greater degree than their New England counterparts. Missionaries who refused to adjust to this basic fact risked their following and, in some cases, their lives. But those, like the Mayhews, who not only tolerated their charges' indigenization of Christianity but also participated in it, laid down the groundwork for what were often lasting Christian Indian communities. To some extent this news is familiar, but it is a story more commonly associated with French Jesuit missions than English Puritan ones. It is time to read between the lines of John Eliot's public pronouncements about his strictness to consider that Mayhew's flexible approach was more representative of peers such as Bourne, Cotton, and probably Eliot too, as testified by their charges' commitment to Christianity before and long after King Philip's War. Puritan missions, no less than Catholic ones, were sites of conversation between two dynamic religious traditions, rather than the imposition of a monolith. Moreover, this account of the mission to the Vineyard Wampanoags demonstrates that syncretic approaches to the Indians' evangelization could and did produce knowledgeable, even doctrinaire, Christians, including Congregationalists. Amid familiar accounts of cultural clashes and cultural misunderstandings in early American encounters were processes of cultural convergence, however ambiguous and incomplete. Only by considering them, too, can scholars begin to understand the numerous communities that were and are distinctly native with a church at the center.

Evidence of the Historical And Current Temporal, Traditional, Cultural and Spiritual Connection Of the Wampanoag Tribe of Gay Head (Aquinnah) To Freetown, Lakeville and Fall River, Massachusetts

by

Chairwoman

Cheryl Andrews-Maltais

Evidence of The Historical and Current Temporal, Traditional, Cultural and Spiritual Connection of The Wampanoag Tribe of Gay Head (Aquinnah) To Freetown, Lakeville and Fall River, Massachusetts

Submitted By:
Cheryl Andrews-Maltais, Chairwoman,
Tribal Council Representative of the Tribal Cultural and Historic Commission
Former Tribal Historic Preservation Officer
Member of the Former Wampanoag Nations Council
Former Historic Interpreter Plimoth Plantation
Wampanoag Cultural Lecturer, Trainer and Educator

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In my many capacities as the current Chairwoman of the Wampanoag Tribe of Gay Head Aquinnah, a current member of our Cultural and Historic Commission with oversight of all traditional, cultural, historic and spiritual activities of our Tribe, as the former Tribal Historic Preservation Officer responsible for the protection and preservation of all things culturally significant to our Tribe and Nation, and the compliance of Federal (and State Agencies) with all Federal laws, statutes and regulations relative to the National Historic Preservation Act (NHPA) 36 CFR parts 800 and all related Federal Antiquities and Archeological Preservation and Protection laws, Indian Religious Freedom Laws, the Native American Graves Protection and Repatriation Act (NAGPRA), and related Executive Orders, statutes and regulations, as well as a member of the Wampanoag Nations Council; responsible for the continuation of recognition of the Wampanoag Nation's People of our region, and former researcher and historic interpreter at the world renowned Plimoth Plantation living museum; I submit this information as foundational information from which specific and more in depth information can be ascertained.

The area under review for consideration for land to be taken into trust for the purposes of gaming and other general purpose uses, is part of a vast overall traditional, historical, cultural and ceremonial complex of the Wampanoag Tribal Nation, specifically connected and significant to the Wampanoag Tribe of Gay Head (Aquinnah) from ancient times to today and into the future.

The Wampanoag Tribe of Gay Head Aquinnah is one of the Tribute Tribes which comprised the Great Wampanoag Nation also known as the Pokanokett [1] Each Tribute Tribe was under the domain of the Great Sachem Ousamequen and his successors; sons Wamsutta and Metocom, and with whom the first Treaty of Peace was signed in 1621. Included amongst the initial signatories of the 1621 Treaty of Peace is the name Epanow, our Sachem of Capawok now known as Noepe or Martha's Vineyard [2].

1) Several variations of the spellings of many of the names of people, places and things exist within the colonial documents and materials.
2) Several variations of this spelling of the Sachem and Island are documented

The name Wampanoag and Pokanokett are interchanged throughout history and as referenced on historical maps. The Wampanoag Nation territory spans from what is now known as the western shores of Mount Hope Bay including Aquiddneck Island, north and eastward to just south of Boston and eastward and southeastward to include southeastern Massachusetts, Cape Cod, the Elizabeth Islands, Martha's Vineyard, Nantucket, Noman's Island and the submerged lands out to the outer continental shelf. [3]

The Wampanoag Tribe of Gay Head (Aquinnah) though its bloodlines and kinships; to and with the mainland Wampanoag, and its current day efforts to protect and preserve specific Traditional Cultural Properties (TCPs), as well as Sacred and Ceremonial Sites contained within the project area and vicinity has been uninterrupted and well known by many locals, State Agencies and Federal Agencies for several years. [4] The places to which we refer to in this application are inextricably part of our Aquinnah Wampanoag history and culture as well as indistinguishably entwined into our traditional practices and existence, and most importantly our cultural identity.

Contained within the totality of the acreage of these lands are also lands and features/elements to which we attached great historical, cultural and spiritual significance. Additionally we are trying to protect and preserve the cultural aspects of certain elements/features which are part of a vast Ceremonial Complex, while balancing our desperate need for land for open space, housing and economic development for our Tribe and Tribal Members living nearby.

By way of background, we the Wampanoag/Pokanokett People are a matrilineal society with specific cultural practices which has historically promoted peace and harmony between each of the Wampanoag Tribute Tribes and Villages, as well as kept us closely related by blood ties in order to maintain our kinship. With the exception of the leadership; the Sachems and Sagamores, typically the steward ownership of land was vested with the women of the Tribe. Men would leave their community when they married and would live within the Tribal Community of their wife and her family. This practice created a never ending continuous bond between all of the Tribes, a continuum and connectivity between the people, the land and the traditional and spiritual beliefs and practices of the People. We are intermarried and interrelated to each of the Tribute Tribes and so we remain as one People.

Since the early 1600's when former Sachems Ousamequen and his eldest son Wamsutta (and his wife Weetamoo) exchanged vast tracks of lands with the English which included the lands within this application, to the proposed and completed sale of some lands in Aquinnah on the Island of Noepe or Capawok (now known as Martha's Vineyard), to the current day activities of our Tribal Historic Preservation Office working to preserve and protect our TCPs and places of spiritual or religious significance to us; we have been connected to these lands and they to us; since time in memorial.

3) Advisory Council on Historic Preservation Letter to Secretary Kenneth Salazar Re: Cape Winds – Horseshoe Shoal Determination of Eligibility for Listing on the National Register of Historic Places as Traditional Cultural Property and Sacred Site Significant to the Wampanoag Tribe of Gay Head Aquinnah under Criteria A, B, C, and D, and Letter from the Massachusetts State Historic Preservation Officer determination of National Register Eligibility under criteria A, B, C, and D

4) Advisory Council on Historic Preservation Letter Re: Kensington Court Lakeville, MA Letter to Chuck Sams the Indian Land Tenure Foundation

Our Sachem Epenow (of Capawok/Noepe/Martha's Vineyard) was one of the initial Sachem signatories on the Treaty of Peace of 1621, the first Treaty in this land between the Wampanoag Nation and the English/Pilgrim Settlers. We have and continue to live and hold ceremony within our Nation between the Island and the Mainland. We have an ancient, historical and contemporary connection to the lands and can demonstrate that connection through documentation, oral history and our Tribal traditional cultural historians, who possess the specialized expertise and unique qualifications to explain our connection to land being considered for return to our People.

As mentioned earlier, contained within the sites under consideration are many cultural features which can be explained in greater detail; their locations, traditional, cultural and spiritual significance and their connection to present day activities, which would also make them eligible for inclusion in the National Register of Historic Places attributed to our Tribe and our People.

We the Aquinnah Wampanoag have maintained a presence on both the Island and Mainland since time in memorial. There are century's worth of documentation evidencing the frequent visitations, extended stays and migration of our Aquinnah People back to the mainland. From census records, to first-hand accounts, to land transaction records, our People from Aquinnah (also known as Gay Head) have moved from and lived in between both the mainland and Island, with a primary concentration retaining a dual connection within our Aboriginal Wampanoag/Pokanokett Territory .

Since before the written record, we shared the ceremonial places, and natural resources with our related Tribes within our entire aboriginal territory. We also have a shared belief and respect for our beloved leader with supernatural abilities named Moshup, his beautiful wife Squant and the mischief maker and sometimes evil Cheepi. We share this belief with our mainland relatives and the evidence of our traditional and spiritual practices of our shared cosmology beliefs are in historic and contemporary writings, petroglyphs, archeological sites, and our pageants and ceremony.

Historically for centuries our People lived on both the Island and on the mainland for many reasons. Some of our People relocated back to the mainland for work; in the late 17th century many of our men were fishermen and whalers out of New Bedford, MA and the surrounding areas. They would move their family closer to where they shipped out, and when they returned (or not), often the family returned to the Island. Other reasons our People moved to the mainland was for educational purposes. The first graduates from Harvard were from our Tribe in 1665, and since then even up to today, our young people and adults leave the Island to pursue educational opportunities on the mainland and amazingly enough still remain in the migratory patterns of our People and relatives. Also since many of our People have married into families from the mainland and them with us, they are able to move there and reconnect with their mainland relatives.

Our continued connection to the mainland doesn't stop with simply the tangible or material opportunities our continued connection to the mainland provides. It also includes the more temporal or intangible spiritual, traditional and cultural beliefs and practices of our People.

Since the early 1960's we as part of the Federate Eastern Indian League (FEIL), and into present day as a members of a Federally Recognized Tribe we would go to our Reservation in Fall River [5], Freetown and Lakeville for seasonal ceremonies and to celebrate or commemorate certain events related to our Wampanoag history or Religious or Ceremonial Practices. This has been a common practice of our People as far back as anyone has been writing about us.

5) Wampanoag Indian Reservation in Fall River and Freetown State Forest and Executive Order 127 of the Governor of Massachusetts dated 1976

As part of the next generation, responsible for the continuation of our traditional and cultural practitioners, I have been a participant in several activities which has kept our connection to the mainland maintained.

Over the last fifty years, as part of our delegation as a child I/we would go to the site of the Royal Burials at Assawamsett and Betty's Neck in Lakeville MA to conduct ceremony and pay tribute and respect to the Ancestors. Since the 1960's we would go to the sight at Mount Hope where Metacom's seat is located in Bristol RI to conduct Ceremony and pay respect to our great Warrior Metacom, son of Massasoit Ousamequen who sacrificed his life for his People. His battle trail is well known and documented. We visit and protect sites all along this historic path that lead to the end of our traditional way of life and culture as we knew it. We also go and pay tribute and ceremony at Profile Rock which is located in the Freetown State Forest which is of great significance to us as Wampanoag People.

For the last 40 or so years, every spring our People have harvested cedar saplings and cedar bark from the few remaining local cedar swaps of Fall River, Freetown and Lakeville for making of our traditional homes, as depicted at Plimoth Plantation and more recently on our Tribal Lands in Aquinnah. Additionally we have and continue harvest bull rush for the same purposes from the mashes within territory which still yield the plant of sufficient size. We continue to seek, locate and harvest certain special and medicinal plants for specific traditional usages. For at least the last decade or so, every spring we visit and conduct ceremony to welcome the seasons, solstices and equinoxes at locations within the project area that we would need to redact under Section 304. Also for the last ten years, we have located and have renewed our winter ceremony at a ceremonial site in the nearby area.

Just as recently as this past March, we took another generation to see a sacred site where Weetamoo would go to seek refuge from the worries and responsibilities of her role as Sachem in her own right, so she could find spiritual guidance from Squant, who would help guide her (and us) in her decisions to do what is best for our People. We also would utilize the lands under review to identify additional sites within the general area and adjacent locations that are connected to other ceremonial sites as part of our Tribes spiritual cosmology complex.

It must also be noted that the record keeping during the 17th, 18th and 19th centuries especially and specifically related to the Indians was not very accurate or consistent. Additionally since there is little reliable documentation, the oral history of the Tribe should be considered with the same validity and weight as the written word, consistent with the regulations of Section 106 of the National Historic Preservation Act, 36 CFR Part 800 and all of the related laws and Executive Orders related to understanding the complexities of early contact between the Indians and Colonials, Indian Traditional and Cultural Practices and Religious and Spiritual beliefs.

I am prepared to share additional information and available documentation in an effort to provide further evidence of our ancient, historic and contemporary connection to the lands under consideration. I would also strongly recommend a site visit to better understand the impact of the area's significance and proximity both in distance and cultural connectedness. We can offer and strongly suggest the assistance of the Advisory Council on Historic Preservation to assist in the understanding and interpretation of the information that we can provide, and how certain elements contained within the project area are in fact unequivocally connected to us the Wampanoag Tribe of Gay Head Aquinnah and our People.

I certify the information contained within this document is accurate to the best of my knowledge.

Cheryl Andrews-Maltais, Chairwoman
The Wampanoag Tribe of Gay Head Aquinnah

20 Black Brook Road
Aquinnah, MA 02535

Phone: 508-645-9265
Fax: 508-645-3790

April 9, 2012

I, Cheryl Andrews-Maltais, Chairwoman for the Wampanoag Tribe of Gay Head (Aquinnah), hereby certify that the attached membership list 2012 as being true and accurate, as of today's date.

Cheryl Andrews-Maltais
Chairwoman
The Wampanoag Tribe of Gay Head (Aquinnah)

68 Fed. Reg 67212

Arapaho Tribes of Oklahoma, Northern Cheyenne Tribe of the Northern Cheyenne Reservation, and Arapaho Tribe of the Wind River Reservation that this notice has been published.

Dated: September 17, 2003.

John Robbins,

Assistant Director, Cultural Resources.

[FR Doc. 03-29778 Filed 11-28-03; 8:45 am]

BILLING CODE 4310-50-S

DEPARTMENT OF THE INTERIOR

National Park Service

Notice of Completion of Inventory of Native American Human Remains and Associated Funerary Objects from Washington County, Rhode Island, in the Possession of the Peabody Museum of Archaeology and Ethnology; Correction

AGENCY: National Park Service, Interior.

ACTION: Notice; correction.

Notice is here given in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3003, of the completion of an inventory of human remains and associated funerary objects in the possession of the Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, MA.

This notice is published as part of the National Park Service's administrative responsibilities under NAGPRA, 25 U.S.C. 3003 (d)(3). The determinations within this notice are the sole responsibility of the museum, institution, or Federal agency that has control of the Native American human remains and associated funerary objects. The National Park Service is not responsible for the determinations within this notice.

This notice corrects the number of associated funerary objects reported in a notice of inventory completion published in the Federal Register on May 7, 1993 (FR Doc. 93-10848, page 27309). A review of museum records resulted in the identification of three additional associated funerary objects from Ninigret Burial Hill, also called the Indian Burial Hill, in Charlestown, RI.

Paragraph 4 of the May 7, 1993, notice is corrected by substituting the following paragraph:

From the first grave came an adult female human cranium (PM 23-6-10/90374/471), a silver chain in two pieces, two fragments of brass soles and one leather sole, fragments of kettle bales, the remnant of a knife, two circle pins, one oval-shaped metal ring, a fragment of glass, a hollow glass stem containing liquid, a silver or pewter vessel with handles and a link chain, a corroded brass container (PM 23-6-10/94193-94200), and three silver brooches. From the second grave came an adult male human femur (PM 23-6-10/60375). There are no associated funerary objects with the femur.

Paragraph 7 of the May 7, 1993, notice is corrected by substituting the following three paragraphs:

Officials of the Peabody Museum of Archaeology and Ethnology have determined that pursuant to 25 U.S.C. 3001 (9-10), the human remains described above represent the physical remains of two individuals of Native American ancestry. Officials of the Peabody Museum of Archaeology and Ethnology also have determined that pursuant to 25 U.S.C. 3001 (3)(A), the 24 objects described above are reasonably believed to have been placed with or near individual human remains at the time of death or later as part of the death rite or ceremony. Lastly, officials of the Peabody Museum of Archaeology and Ethnology have determined that, pursuant to 25 U.S.C. 3001 (2), there is a relationship of shared group identity that can be reasonably traced between the human remains and associated funerary objects and the Narragansett Indian Tribe of Rhode Island.

Representatives of any other Indian tribe that believes itself to be culturally affiliated with the human remains and associated funerary objects should contact Patricia Capone, Repatriation Coordinator, Peabody Museum of Archaeology and Ethnology, Harvard University, 11 Divinity Avenue, Cambridge, MA 02138, telephone (617) 496-3702, before December 31, 2003. Repatriation of the human remains and associated funerary objects to the Narragansett Indian Tribe of Rhode Island may begin after that date if no additional claimants come forward.

The Peabody Museum of Archaeology and Ethnology is responsible for notifying the Narragansett Indian Tribe of Rhode Island that this notice has been published.

Dated: October 27, 2003.

John Robbins,

Assistant Director, Cultural Resources.

[FR Doc. 03-29767 Filed 11-28-03; 8:45 am]

BILLING CODE 4310-50-S

DEPARTMENT OF THE INTERIOR

National Park Service

Notice of Intent to Repatriate Cultural Items: Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, MA

AGENCY: National Park Service, Interior.

ACTION: Notice.

Notice is here given in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA), 43 CFR 10.8 (f), of the intent to repatriate cultural items in the possession of the Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, MA, that meet the definition of unassociated funerary objects under 25 U.S.C. 3001.

This notice is published as part of the National Park Service's administrative responsibilities under NAGPRA, 25 U.S.C. 3003 (d)(3). The determinations within this notice are the sole responsibility of the museum, institution, or Federal agency that has control of the cultural items. The National Park Service is not responsible for the determinations within this notice.

The three cultural items are two brass tubes and one string of shell beads.

The two brass tubes were collected by J.V.C. Smith in 1831 from Fall River, Bristol County, MA, and were donated to the Peabody Museum of Archaeology and Ethnology by F. Kneeland in 1886. Museum documentation indicates that the brass tubes were recovered from a grave. The Peabody Museum of Archaeology and Ethnology is not in possession of the human remains from this burial.

The interment most likely dates to the Historic/Contact period (post-A.D. 1500). According to the Peabody Museum Annual Report of 1887, the human remains from this grave site were wrapped in several layers of braided or woven bark-cloth with an outer layer of cedar bark. Woven mats and bark were commonly used in Wampanoag burials during the Late Woodland period and later (post-A.D. 1000). Sheet brass and brass objects were European trade items, and therefore indicate a postcontact temporal context.

At an unknown date, a string of shell beads was recovered from a grave site in Bridgewater, Plymouth County, MA. The string of shell beads was donated to the Peabody Museum of Archaeology and Ethnology in 1899 by H.W. Hatch. The Peabody Museum of Archaeology and Ethnology is not in possession of the human remains from this burial.

The interment most likely dates to the Historic/Contact period (post-A.D. 1500). According to museum documentation, the shell beads were found with "porcelain beads," which are not in the possession of the Peabody Museum of Archaeology and Ethnology. True porcelain beads do not appear in historic contexts until the 19th century, although beads made from money cowry shell (C. moneta) were called "porcelain," and were imported and traded by Europeans before this time. Even if these beads are of white glass rather than shell, glass beads were introduced by Europeans as trade items in the 17th century, and would also support a postcontact date.

Oral tradition and historical documentation indicate that Fall River and Bridgewater, MA, are within the aboriginal and historic homeland of the Wampanoag Nation. The present-day Indian tribe and groups that are most closely affiliated with the Wampanoag Nation are the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, Mashpee Wampanoag Indian Tribe (a nonfederally recognized Indian group), and Assonet Band of the Wampanoag Nation Tribe (a nonfederally recognized Indian group).

Officials of the Peabody Museum of Archaeology and Ethnology have determined that, pursuant to 25 U.S.C. 3001 (3)(B), the cultural items are reasonably believed to have been placed with or near individual human remains at the time of death or later as part of the death rite or ceremony and are believed, by a preponderance of the evidence, to have been removed from a specific burial site of an Native American individual. Officials of the Peabody Museum of Archaeology and Ethnology also have determined that, pursuant to 25 U.S.C. 3001 (2), there is a relationship of shared group identity that can be reasonably traced between the unassociated funerary objects and the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, and that there is a cultural relationship between the unassociated funerary objects and Mashpee Wampanoag Indian Tribe (a nonfederally recognized Indian group) and Assonet Band of the Wampanoag Nation (a nonfederally recognized Indian group).

Representatives of any other Indian tribe that believes itself to be culturally affiliated with the unassociated funerary objects should contact Patricia Capone, Repatriation Coordinator, Peabody Museum of Archaeology and Ethnology, Harvard University, 11 Divinity Avenue, Cambridge, MA 02138, telephone (617) 496–3702, before December 31, 2003. Repatriation of the unassociated funerary objects to the Wampanoag Repatriation Confederation on behalf of the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, Mashpee Wampanoag Indian Tribe (a nonfederally recognized Indian group), and Assonet Band of the Wampanoag Nation (a nonfederally recognized Indian group) may proceed after that date if no additional claimants come forward.

The Peabody Museum of Archaeology and Ethnology is responsible for notifying the Wampanoag Repatriation Confederation, Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, Mashpee Wampanoag Indian Tribe (a nonfederally recognized Indian group), and Assonet Band of the Wampanoag Nation (a nonfederally recognized Indian group) that this notice has been published.

Dated: October 27, 2003.

John Robbins,

Assistant Director, Cultural Resources.

[FR Doc. 03–29769 Filed 11–28–03; 8:45 am]

BILLING CODE 4310–50–S

DEPARTMENT OF THE INTERIOR

National Park Service

Notice of Inventory Completion: Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, MA

AGENCY: National Park Service, Interior.

ACTION: Notice.

Notice is here given in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3003, of the completion of an inventory of human remains in the possession of the Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, MA. The human remains were removed from Apache County, AZ.

This notice is published as part of the National Park Service's administrative responsibilities under NAGPRA, 25 U.S.C. 3003 (d)(3). The determinations within this notice are the sole responsibility of the museum, institution, or Federal agency that has control of the Native American human remains. The National Park Service is not responsible for the determinations within this notice.

A detailed assessment of the human remains was made by the Peabody Museum of Archaeology and Ethnology professional staff in consultation with representatives of the Hopi Tribe of Arizona; Navajo Nation, Arizona, New Mexico & Utah; Pueblo of Acoma, New Mexico; and Pueblo of Laguna, New Mexico.

In 1884, human remains representing one individual were removed from Fort Defiance, Apache County, AZ, by Dr. Sampson. The human remains were donated to the Peabody Museum of Archaeology and Ethnology the same year. Museum documentation describes the human remains as "Navajo?". No known individual was identified. No funerary objects are present.

In 1903, human remains representing a minimum of three individuals were removed from Massacre Cave, Canyon del Muerto, Apache County, AZ, by Stewart Cullin on behalf of the Brooklyn Museum, Brooklyn, NY. In 1938, the human remains were permanently loaned to the Peabody Museum of Archaeology and Ethnology. Museum documentation describes the human remains as probably Navajo. Massacre Cave is the site of the 1805 massacre of Navajo people by Spanish colonial military forces. Two of the human remains exhibit gun shot wounds, which indicate a postcontact date consistent with the 1805 massacre. No known individuals were identified. No funerary objects are present.

Cranial morphology indicates that the human remains from Fort Defiance and Canyon del Muerto, AZ, are four individuals of Navajo ancestry.

Although the lands from which the human remains were removed are currently under the jurisdiction of the U.S. Department of the Interior, Bureau of Indian Affairs, the Peabody Museum of Archaeology and Ethnology has possession and control of the human remains because their removal from tribal land predates the permit requirements established by the Antiquities Act of 1906.

Officials of the Peabody Museum of Archaeology and Ethnology have determined that, pursuant to 25 U.S.C. 3001 (9–10), the human remains described above represent the physical remains of four individuals of Native American ancestry. Officials of the Peabody Museum of Archaeology and Ethnology also have determined that, pursuant to 25 U.S.C. 3001 (2), there is a relationship of shared group identity that can be reasonably traced between the Native American human remains and the Navajo Nation, Arizona, New Mexico & Utah.

Representatives of any other Indian tribe that believes itself to be culturally affiliated with the human remains should contact Patricia Capone, Repatriation Coordinator, Peabody Museum of Archaeology and Ethnology, Harvard University, 11 Divinity Avenue, Cambridge, MA 02138, telephone (617)

72 Fed. Reg 12190

The Apache Tribe of Oklahoma; Cheyenne-Arapaho Tribes of Oklahoma; Fort Sill Apache Tribe of Oklahoma; Kiowa Indian Tribe of Oklahoma; Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation, Montana; San Carlos Apache Tribe of the San Carlos Reservation, Arizona; Southern Ute Indian Tribe of the Southern Ute Reservation, Colorado; Tonto Apache Tribe of Arizona; Ute Indian Tribe of the Uintah & Ouray Reservation, Utah; White Mountain Apache Tribe of the Fort Apache Reservation, Arizona; and Yavapai-Apache Nation of the Camp Verde Indian Reservation, Arizona were contacted for consultation purposes but did not attend the consultation meetings.

In 1958, human remains representing a minimum of four individuals were removed from Fort Union National Monument in Mora County, NM, during the construction of park housing. No known individuals were identified. All but 10 of the approximately 40 artifacts found with the human remains have been lost or have disintegrated. The 10 surviving associated funerary objects are 1 turquoise bead, 1 shell bead, 1 fragmentary shell bead, 1 leather fragment, 2 pieces of fabric, 1 fragment of bark, 2 fragments of rotted leather, and 1 fragment of material that is either rotted leather or metal. Most of the objects are only identifiable by consulting the park's museum catalog cards.

Based on skeletal and artifactual analysis, it appears that the four men were beaten, shot, dragged using leather straps found with the bodies, and buried in a grave approximately 18 inches deep. The mass grave was located immediately adjacent to where the Santa Fe Trail entered Fort Union. The men were laid out in an orderly fashion, oriented to the southeast. Most items of value appear to have been removed from the bodies. Buttons and the caliber of bullets used to kill the men indicate that the murders took place sometime between the years of 1863 and 1872. At the request of officials of Fort Union National Monument, a cultural affiliation report was prepared in 2006 in an effort to determine cultural affiliation by examining all available evidence.

Officials of Fort Union National Monument have determined that, pursuant to 25 U.S.C. 3001 (9–10), the human remains described above represent the physical remains of four individuals of Native American ancestry. Officials of Fort Union National Monument also have determined that, pursuant to 25 U.S.C. 3001 (3)(A), the ten objects described above are reasonably believed to have been placed with or near individual human remains at the time of death or later as part of the death rite or ceremony. Lastly, officials of Fort Union National Monument have determined that, pursuant to 25 U.S.C. 3001 (2), a relationship of shared group identity cannot reasonably be traced between the Native American human remains and associated funerary objects and any present-day Indian tribe.

The Native American Graves Protection and Repatriation Review Committee (Review Committee) is responsible for recommending specific actions for disposition of culturally unidentifiable human remains. In October 2006, Fort Union National Monument requested that the Review Committee recommend repatriation of the four culturally unidentifiable human remains and ten associated funerary objects to the Jicarilla Apache Nation, New Mexico and Ute Mountain Tribe of the Ute Mountain Reservation, Colorado, New Mexico & Utah as co-claimants because the human remains and cultural items were found within the tribes' aboriginal and historical territory. The Review Committee considered the proposal at its November 2006 meeting, and recommended disposition of the human remains and associated funerary objects to the Jicarilla Apache Nation, New Mexico and Ute Mountain Tribe of the Ute Mountain Reservation, Colorado, New Mexico & Utah. The National Park Service intends to convey the ten associated funerary objects to the tribes pursuant to 16 U.S.C. 18f–2.

A December 12, 2006, letter from the Designated Federal Official, writing on behalf of the Secretary of the Interior, recommended disposition of the physical remains of four culturally unidentifiable individuals and ten associated funerary objects to the Jicarilla Apache Nation, New Mexico and Ute Mountain Tribe of the Ute Mountain Reservation, Colorado, New Mexico & Utah contingent on the publication of a Notice of Inventory Completion in the Federal Register. This notice fulfills that requirement.

Representatives of any other Indian tribe that believes itself to be culturally affiliated with the human remains and associated funerary objects should contact Marie Frias Sauter, superintendent, Fort Union National Monument, P.O. Box 127, Watrous, NM 87753, telephone (505) 425–8025, before April 16, 2007. Disposition of the human remains and associated funerary objects to the Jicarilla Apache Nation, New Mexico and Ute Mountain Tribe of the Ute Mountain Reservation, Colorado, New Mexico & Utah may proceed after that date if no additional claimants come forward.

Fort Union National Monument is responsible for notifying the Arapaho Tribe of the Wind River Reservation, Wyoming; Comanche Nation, Oklahoma; Fort McDowell Yavapai Nation, Arizona; Jicarilla Apache Nation, New Mexico; Mescalero Apache Tribe of the Mescalero Reservation, New Mexico; Navajo Nation, Arizona, New Mexico & Utah; and Ute Mountain Tribe of the Ute Mountain Reservation, Colorado, New Mexico & Utah that this notice has been published.

Dated: February 8, 2007.

Sherry Hutt,

Manager, National NAGPRA Program.

[FR Doc. E7–4728 Filed 3–14–07; 8:45 am]

BILLING CODE 4312–50–S

DEPARTMENT OF THE INTERIOR

National Park Service

Notice of Inventory Completion: Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, MA

AGENCY: National Park Service, Interior.

ACTION: Notice.

Notice is here given in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3003, of the completion of an inventory of human remains in the possession of Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, MA. The human remains were removed from Plymouth County, MA.

This notice is published as part of the National Park Service's administrative responsibilities under NAGPRA, 25 U.S.C. 3003 (d)(3). The determinations in this notice are the sole responsibility of the museum, institution, or Federal agency that has control of the Native American human remains. The National Park Service is not responsible for the determinations in this notice.

A detailed assessment of the human remains was made by Peabody Museum of Archaeology and Ethnology professional staff in consultation with representatives of the Wampanoag Repatriation Confederation on behalf of the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts; Assonet Band of the Wampanoag Nation, a non-federally recognized Indian group; and Mashpee Wampanoag Indian Tribe, a non-federally recognized Indian group.

Between 1890 and 1900, human remains representing a minimum of two individuals were removed from Watson's Hill, south side of Town Brook, in Plymouth, Plymouth County, MA, by the Douglas family while the family was digging a cellar for their house. The human remains were transferred to Dr. George H. Jackson of Plymouth at an unknown date. In 1939, the human remains were donated to the Peabody Museum of Archaeology and Ethnology by Dr. Jackson through the Pilgrim Society of Plymouth. No known individuals were identified. No associated funerary objects are present.

Osteological characteristics indicate that the individuals are Native American. The interments most likely date to the Late Woodland period or later (post-A.D. 1000). Historical documentation, as well as information from the Pilgrim Society, describes Watson's Hill as a known Late Woodland (A.D. 1000–1500) and Historic/Contact period (post-A.D. 1500) Native American site. Oral tradition and historical documentation also indicate that Plymouth is within the aboriginal and historic homeland of the Wampanoag Nation. The present-day tribes that are most closely affiliated with the Wampanoag Nation are the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts; Assonet Band of the Wampanoag Nation, a non-federally recognized Indian group; and Mashpee Wampanoag Indian Tribe, a non-federally recognized Indian group.

Officials of the Peabody Museum of Archaeology and Ethnology have determined that, pursuant to 25 U.S.C. 3001 (9–10), the human remains described above represent the physical remains of two individuals of Native American ancestry. Officials of the Peabody Museum of Archaeology and Ethnology also have determined that, pursuant to 25 U.S.C. 3001 (2), there is a relationship of shared group identity that can be reasonably traced between the Native American human remains and the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts. Furthermore, officials of the Peabody Museum of Archaeology and Ethnology have determined that there is a cultural relationship between the human remains and the Assonet Band of the Wampanoag Nation, a non-federally recognized Indian group, and Mashpee Wampanoag Indian Tribe, a non-federally recognized Indian group.

Representatives of any other Indian tribe that believes itself to be culturally affiliated with the human remains should contact Patricia Capone, Repatriation Coordinator, Peabody Museum of Archaeology and Ethnology, Harvard University, 11 Divinity Ave., Cambridge, MA 02138, telephone (617) 496–3702, before April 16, 2007. Repatriation of the human remains to the Wampanoag Repatriation Confederation on behalf of the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts; Assonet Band of the Wampanoag Nation, a non-federally recognized Indian group; and Mashpee Wampanoag Indian Tribe, a non-federally recognized Indian group may proceed after that date if no additional claimants come forward.

The Peabody Museum of Archaeology and Ethnology is responsible for notifying the Wampanoag Repatriation Confederation, Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts; Assonet Band of the Wampanoag Nation, a non-federally recognized Indian group; and Mashpee Wampanoag Indian Tribe, a non-federally recognized Indian group that this notice has been published.

Dated: January 30, 2007

Sherry Hutt,

National NAGPRA Program.

[FR Doc. E7–4727 Filed 3–14–07; 8:45 am]

BILLING CODE 4312–50–S

DEPARTMENT OF THE INTERIOR

National Park Service

Notice of Inventory Completion: Thomas Burke Memorial Washington State Museum, University of Washington, Seattle, WA

AGENCY: National Park Service, Interior.

ACTION: Notice.

Notice is here given in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3003, of the completion of an inventory of human remains in the possession of the Thomas Burke Memorial Washington State Museum (Burke Museum), University of Washington, Seattle, WA. The human remains were removed from Okanogan County, WA.

This notice is published as part of the National Park Service's administrative responsibilities under NAGPRA, 25 U.S.C. 3003 (d)(3). The determinations in this notice are the sole responsibility of the museum, institution, or Federal agency that has control of the Native American human remains. The National Park Service is not responsible for the determinations in this notice.

A detailed assessment of the human remains was made by Burke Museum professional staff in consultation with representatives of the Confederated Tribes of the Colville Reservation, Washington.

In 1908, human remains representing a minimum of one individual were removed from Winthrop in Okanogan County, WA, by CPT Frank Lord. In 1910, the human remains were received from Captain Lord and accessioned by the Burke Museum (Burke Accn. No. 242). No known individual was identified. No associated funerary objects are present.

The human remains had previously been identified non- Native American. However, after further review, the preponderance of the evidence identifies the human remains as Native American. The original donor identified the human remains as "Indian". The majority of the osteological evidence identified by physical anthropologists determined that the human remains are Native American.

According to early and late ethnographic documentation the Methow Tribe are the aboriginal occupants of the Winthrop area (Miller 1998; Mooney 1896; Ray 1936; Spier 1936). The Colville Reservation was established by Executive Order in 1872 for Methow Tribe and other tribes. The Moses Columbia Reservation was later established in 1879 and also included members of the Methow Tribe. In 1886, the Moses Columbia Reservation was disbanded and the residents were moved to the Colville Reservation. Descendants of the Methow Tribe are members of the Confederated Tribes of the Colville Reservation, Washington.

Officials of the Burke Museum have determined that, pursuant to 25 U.S.C. 3001 (9–10), the human remains described above represent the physical remains of one individual of Native American ancestry. Officials of the Burke Museum also have determined that, pursuant to 25 U.S.C. 3001 (2), there is a relationship of shared group identity that can be reasonably traced between the Native American human remains and the Confederated Tribes of the Colville Reservation, Washington.

Representatives of any other Indian tribe that believes itself to be culturally affiliated with the human remains should contact Dr. Peter Lape, Burke Museum, University of Washington, Box 353010, Seattle, WA 98195–3010, telephone (206) 685–2282, before April 16, 2007. Repatriation of the human remains to the Confederated Tribes of the Colville Reservation, Washington may proceed after that date if no additional claimants come forward.

The Burke Museum is responsible for notifying the Confederated Tribes of the Colville Reservation, Washington that this notice has been published.

71 Fed. Reg 70982

Assonet Band of the Wampanoag Nation (a non-federally recognized Indian group), and Mashpee Wampanoag Indian Tribe (a non-federally recognized Indian group).

Officials of the Peabody Museum of Archaeology and Ethnology have determined that, pursuant to 25 U.S.C. 3001 (3)(B), the one cultural item described above is reasonably believed to have been placed with or near individual human remains at the time of death or later as part of the death rite or ceremony and is believed, by a preponderance of the evidence, to have been removed from a specific burial site of a Native American individual. Officials of the Peabody Museum of Archaeology and Ethnology have also determined that, pursuant to 25 U.S.C. 3001 (2), there is a relationship of shared group identity that can be reasonably traced between the unassociated funerary object and the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, and that there is a cultural relationship between the unassociated funerary object and the Assonet Band of the Wampanoag Nation (a non-federally recognized Indian group) and Mashpee Wampanoag Indian Tribe (a non-federally recognized Indian group).

Representatives of any other Indian tribe that believes itself to be culturally affiliated with the unassociated funerary object should contact Patricia Capone, Repatriation Coordinator, Peabody Museum of Archaeology and Ethnology, Harvard University, 11 Divinity Avenue, Cambridge, MA 02138, telephone (617) 496–3702, before January 8, 2007. Repatriation of the unassociated funerary object to the Wampanoag Repatriation Confederation, on behalf of the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, Assonet Band of the Wampanoag Nation (a non-federally recognized Indian group), and Mashpee Wampanoag Indian Tribe (a non-federally recognized Indian group) may proceed after that date if no additional claimants come forward.

The Peabody Museum of Archaeology and Ethnology is responsible for notifying the Wampanoag Repatriation Confederation, Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, Assonet Band of the Wampanoag Nation (a non-federally recognized Indian group), and Mashpee Wampanoag Indian Tribe (a non-federally recognized Indian group) that this notice has been published.

Dated: November 9, 2006.

Sherry Hutt,

Manager, National NAGPRA Program.

[FR Doc. E6–20702 Filed 12–6–06; 8:45 am]

BILLING CODE 4312–50–S

DEPARTMENT OF THE INTERIOR

National Park Service

Notice of Intent to Repatriate Cultural Items: Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, MA; Correction

AGENCY: National Park Service, Interior.

ACTION: Notice; correction.

Notice is here given in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3003 (5), of the intent to repatriate cultural items in the possession of the Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, MA, that meet the definition of "unassociated funerary objects" under 25 U.S.C. 3001. The cultural items were removed from Bristol and Plymouth Counties, MA.

This notice is published as part of the National Park Service's administrative responsibilities under NAGPRA, 25 U.S.C. 3003 (d)(3). The determinations in this notice are the sole responsibility of the museum, institution, or Federal agency that has control of the cultural items. The National Park Service is not responsible for the determinations in this notice.

This notice corrects the number of unassociated funerary objects reported in a Notice of Intent to Repatriate published in the Federal Register on December 1, 2003, (FR Doc 03–29769, pages 67212–67213). In 2006, the Peabody Museum of Archaeology and Ethnology identified one additional unassociated funerary object from a site in southeastern MA. This notice changes the number of unassociated funerary objects from three to four and supercedes the previously published Notice of Intent to Repatriate.

A detailed assessment of the cultural items was made by the Peabody Museum of Archaeology and Ethnology professional staff in consultation with representatives of the Wampanoag Repatriation Confederation, on behalf of the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, Assonet Band of the Wampanoag Nation (a non-federally recognized Indian group), and Mashpee Wampanoag Indian Tribe (a non-federally recognized Indian group).

The four cultural items are two brass tubes, one perforated copper point, and one string of shell beads.

The two brass tubes were collected by J.V.C. Smith in 1831 from Fall River, Bristol County, MA, and were donated to the Peabody Museum of Archaeology and Ethnology, by F. Kneeland in 1886. Museum documentation indicates that the brass tubes were recovered from a grave. The Peabody Museum of Archaeology and Ethnology is not in possession of the human remains from this burial.

The interment most likely dates to the Historic/Contact period (post–A.D. 1500). According to the Peabody Museum Annual Report of 1887, the human remains from this grave site were wrapped in several layers of braided or woven bark-cloth with an outer layer of cedar bark. Woven mats and bark were commonly used in Wampanoag burials during the Late Woodland period and later (post–A.D. 1000). Sheet brass and brass objects were European trade items and therefore indicate a postcontact temporal context.

At an unknown date, a string of shell beads was recovered from a grave site in Bridgewater, Plymouth County, MA. The string of shell beads was donated to the Peabody Museum of Archaeology and Ethnology in 1899 by H.W. Hatch. The Peabody Museum of Archaeology and Ethnology is not in possession of the human remains from this burial.

The interment most likely dates to the Historic/Contact period (post–A.D. 1500). According to museum documentation, the shell beads were found with "porcelain beads," which are not in the possession of the Peabody Museum of Archaeology and Ethnology. True porcelain beads do not appear in historic contexts until the 19th century, although beads made from money cowry shell (C. moneta) were called "porcelain," and were imported and traded by Europeans as trade items by the 17th century, which would support a postcontact date. Even if these beads are of white glass rather than shell, glass beads were introduced by Europeans as trade items in the 17th century and would also support a postcontact date.

In 1845, one perforated copper point was collected by Mr. Howard in Fairhaven, Bristol County, MA. The same year, Mr. Howard gave the point to Mary L. Rotch. Miss. Rotch donated the copper point to the Peabody Museum of Archaeology and Ethnology in 1913. Museum documentation indicates that the copper point was recovered from a grave. The Peabody Museum of Archaeology and Ethnology is not in possession of the human remains from this burial.

This interment most likely dates to the Historic/Contact period (post 500 B.P.). Copper was a European import

item and its presence supports a Contact period date. This triangular point is of the Levanna type, as are most European sheet metal projectile points found in southern New England.

Oral tradition and historical documentation indicate that Fall River, Bridgewater, and Fairhaven, MA, are within the aboriginal and historic homeland of the Wampanoag Nation. The present-day groups that are most closely affiliated with the Wampanoag Nation are the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, Assonet Band of the Wampanoag Nation (a non-federally recognized Indian group), and Mashpee Wampanoag Indian Tribe (a non-federally recognized Indian group).

Officials of the Peabody Museum of Archaeology and Ethnology have determined that, pursuant to 25 U.S.C. 3001 (3)(B), the four cultural items described above are reasonably believed to have been placed with or near individual human remains at the time of death or later as part of the death rite or ceremony and are believed, by a preponderance of the evidence, to have been removed from a specific burial site of a Native American individual. Officials of the Peabody Museum of Archaeology and Ethnology have also determined that, pursuant to 25 U.S.C. 3001 (2), there is a relationship of shared group identity that can be reasonably traced between the unassociated funerary objects and the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, and that there is a cultural relationship between the unassociated funerary objects and the Assonet Band of the Wampanoag Nation (a non-federally recognized Indian group) and Mashpee Wampanoag Indian Tribe (a non-federally recognized Indian group).

Representatives of any other Indian tribe that believes itself to be culturally affiliated with the unassociated funerary objects should contact Patricia Capone, Repatriation Coordinator, Peabody Museum of Archaeology and Ethnology, Harvard University, 11 Divinity Avenue, Cambridge, MA 02138, telephone (617) 496–3702, before January 8, 2007. Repatriation of the unassociated funerary objects to the Wampanoag Repatriation Confederation, on behalf of the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, Assonet Band of the Wampanoag Nation (a non-federally recognized Indian group), and Mashpee Wampanoag Indian Tribe (a non-federally recognized Indian group) may proceed after that date if no additional claimants come forward.

The Peabody Museum of Archaeology and Ethnology is responsible for notifying the Wampanoag Repatriation Confederation, Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, Assonet Band of the Wampanoag Nation (a non-federally recognized Indian group), and Mashpee Wampanoag Indian Tribe (a non-federally recognized Indian group) that this notice has been published.

Dated: November 9, 2006

Sherry Hutt,

Manager, National NAGPRA Program.

[FR Doc. E6–20749 Filed 12–6–06; 8:45 am]

BILLING CODE 4312–50–S

INTERNATIONAL TRADE COMMISSION

[Inv. No. 337–TA–589]

In the Matter of Certain Switches and Products Containing Same; Notice of Investigation

AGENCY: U.S. International Trade Commission.

ACTION: Institution of investigation pursuant to 19 U.S.C. 1337.

SUMMARY: Notice is hereby given that a complaint was filed with the U.S. International Trade Commission on November 6, 2006, under section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. 1337, on behalf of ATEN International Co., Ltd. of Taiwan and ATEN Technology, Inc. of Irvine, California. A supplement to the complaint was filed on November 27, 2006. The complaint alleges violations of section 337 in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain switches and products containing same by reason of infringement of U.S. Patent No. 7,035,112. The complaint further alleges that an industry in the United States exists or is in the process of being established as required by subsection (a)(2) of section 337.

The complainant requests that the Commission institute an investigation and, after the investigation, issue a permanent exclusion order and permanent cease and desist orders.

ADDRESSES: The complaint, except for any confidential information contained therein, is available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, SW., Room 112, Washington, DC 20436, telephone 202–205–2000. Hearing impaired individuals are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on 202–205–1810. Persons with mobility impairments who will need special assistance in gaining access to the Commission should contact the Office of the Secretary at 202–205–2000. General information concerning the Commission may also be obtained by accessing its Internet server at *http://www.usitc.gov*. The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at *http://edis.usitc.gov*.

FOR FURTHER INFORMATION CONTACT: Anne M. Goalwin, Esq., Office of Unfair Import Investigations, U.S. International Trade Commission, telephone (202) 205–2574.

Authority: The authority for institution of this investigation is contained in section 337 of the Tariff Act of 1930, as amended, and in section 210.10 of the Commission's Rules of Practice and Procedure, 19 CFR 210.10 (2006).

Scope of Investigation: Having considered the complaint, the U.S. International Trade Commission, on December 1, 2006, ordered that—

(1) Pursuant to subsection (b) of section 337 of the Tariff Act of 1930, as amended, an investigation be instituted to determine whether there is a violation of subsection (a)(1)(B) of section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain switches or products containing same by reason of infringement of one or more of claims 1 and 12–21 of U.S. Patent No. 7,035,112, and whether an industry in the United States exists or is in the process of being established as required by subsection (a)(2) of section 337;

(2) For the purpose of the investigation so instituted, the following are hereby named as parties upon which this notice of investigation shall be served:

(a) The complainants are—

ATEN International Co., Ltd., 3F, No. 125, Sec. 2, Datung Road, Shijr City, Taipei, Taiwan 221.

ATEN Technology, Inc., 23 Hubble Drive, Irvine, CA 92618.

(b) The respondents are the following entities alleged to be in violation of section 337, and are the parties upon which the complaint is to be served:

Belkin Corporation, 501 West Walnut Street, Compton, CA 90220.

Belkin Logistics, Inc., 501 West Walnut Street, Compton, CA 90220.

Emine Technology Co., Ltd., 8 Fl., No. 6, Sec. 2, Nan-Jing E. Rd., Taipei, Taiwan.

JustCom Tech, Inc., 2283 Paragon Drive, San Jose, CA 95131.

70 Fed. Reg 16840

Gay Head (Aquinnah) of Massachusetts, Mashpee Wampanoag Tribe (a nonfederally recognized Indian group), and Assonet Band of the Wampanoag Nation (a nonfederally recognized Indian group).

In 1930, human remains representing a minimum of one individual were removed from the Herring Weir site (19-PL-249/250), Mattapoisett, Plymouth County, MA, by Ralph Metcalf. The site was located at the top of a bank adjacent to a stream emptying into Mattapoisett Bay. In 1945, Maurice Robbins obtained the human remains and donated them to the Robert S. Peabody Museum of Archaeology in 1950. No known individual was identified. The 23 associated funerary objects are 12 fragments of organic materials, including matting, animal skin, and an animal tooth; 4 copper fragments; 4 animal bones; 2 pyrite fragments; and 1 lot of bark fragments.

Other burials at the Herring Weir site contained objects of Euroamerican manufacture. Based on artifact typologies, the Herring Weir Site is dated to the Late Woodland/Early Contact period (circa A.D. 1000-1650).

In 1945 and 1949, human remains representing a minimum of three individuals were removed from the Taylor Hill site (19-BN-106), in Wellfleet, Barnstable County, MA, by Howard Torrey and Ripley Bullen and were donated to the Robert S. Peabody Museum of Archaeology at an unknown time. No known individuals were identified. The eight associated funerary objects are one harpoon point, two mollusk shells, one deer-bone awl, two lots of animal bones, one projectile point, and one biface fragment.

Based on artifact characteristics and radiocarbon dating, the Taylor Hill site is dated to the Late Middle Woodland to Late Woodland period (circa A.D. 500-1500). Deer bone that was associated with the human remains from the site has been dated to A.D. 976-1010 (calibrated).

In 1935, human remains representing a minimum of one individual were removed from the Indian Cove Bluff site (19-BN-104), in Wellfleet, Barnstable County, MA, by Howard Torrey and were donated to the Robert S. Peabody Museum of Archaeology at an unknown time. No known individual was identified. No associated funerary objects are present

Based on artifact characteristics and radiocarbon dating, the Indian Cove Bluff site is dated to the Late Middle Woodland to Late Woodland periods (circa A.D. 500-1500).

In 1915, human remains representing a minimum of two individuals were removed from the Corn Hill site (19-BN-144/45), in Truro, Barnstable County, MA, by Warren K. Moorehead and Fred Luce. Shortly afterwards, Mr. Luce donated the human remains to the Haverhill Historical Society. In 1993, the Haverhill Historical Society transferred the human remains and funerary objects to the Robert S. Peabody Museum of Archaeology. No known individuals were identified. The 53 associated funerary objects are 1 metal blade, approximately 50 iron fragments, 1 lot of soil stained with ochre, and 1 lot of wood and bark fragments stained with ochre.

Corn Hill is an historically documented Contact period site (post-A.D. 1500).

Increased frequency and longer-term use of coastal areas by Native American people in the outer Cape Cod and Buzzards Bay, MA, area began in the Middle Woodland period. This pattern continued and intensified into the Contact Period. With the formation of highly productive and more stable salt-marsh and estuary environments, long-term occupation became a viable settlement option. The locally focused, year-round exploitation of this environmental diversity first becomes visible in late Middle Woodland sites and continued to characterize Wampanoag subsistence patterns and apparent social organization throughout the Late Woodland/Contact periods. Concomitant with this evidence for year-round occupation are mortuary data that indicate a significantly different pattern than that evident on earlier sites in the same region. Wampanoag descendents are today represented by the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, Mashpee Wampanoag Tribe (a nonfederally recognized Indian group), and Assonet Band of the Wampanoag Nation (a nonfederally recognized Indian group).

Officials of the Robert S. Peabody Museum of Archaeology have determined that, pursuant to 25 U.S.C. 3001 (9-10), the human remains described above represent the physical remains of seven individuals of Native American ancestry. Officials of the Robert S. Peabody Museum of Archaeology also have determined that, pursuant to 25 U.S.C. 3001 (3)(A), the 84 objects described above are reasonably believed to have been placed with or near individual human remains at the time of death or later as part of the death rite or ceremony. Lastly, officials of the Robert S. Peabody Museum of Archaeology have determined that, pursuant to 25 U.S.C. 3001 (2), there is a relationship of shared group identity that can be reasonably traced between the Native American human remains and associated funerary objects and the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, and there is a cultural relationship between the Native American human remains and associated funerary objects and the Mashpee Wampanoag Tribe (a nonfederally recognized Indian group), and the Assonet Band of the Wampanoag Nation (a nonfederally recognized Indian group).

Representatives of any other Indian tribe that believes itself to be culturally affiliated with the human remains and associated funerary objects should contact Malinda S. Blustain, Director, Robert S. Peabody Museum of Archaeology, Phillips Academy, Andover, MA 01810, telephone (978) 749-4490, before May 2, 2005. Repatriation of the human remains and associated funerary objects to the Wampanoag Repatriation Confederation on behalf of the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, Mashpee Wampanoag Tribe (a nonfederally recognized Indian group), and Assonet Band of the Wampanoag Nation (a nonfederally recognized Indian group) may proceed after that date if no additional claimants come forward.

The Robert S. Peabody Museum of Archaeology is responsible for notifying the Wampanoag Repatriation Confederation, Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, the Mashpee Wampanoag Tribe (a nonfederally recognized Indian group), and the Assonet Band of the Wampanoag Nation (a nonfederally recognized Indian group) that this notice has been published.

Dated: February 11, 2005.

Sherry Hutt,

Manager, National NAGPRA Program.

[FR Doc. 05-6460 Filed 3-31-05; 8:45 am]

BILLING CODE 4312-50-S

DEPARTMENT OF THE INTERIOR

National Park Service

Notice of Intent to Repatriate Cultural Items: Robert S. Peabody Museum of Archaeology, Phillips Academy, Andover, MA

AGENCY: National Park Service, Interior.

ACTION: Notice.

Notice is here given in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3005, of the intent to repatriate cultural items in the

possession of the Robert S. Peabody Museum of Archaeology, Phillips Academy, Andover, MA, that meet the definition of unassociated funerary objects under 25 U.S.C. 3001.

This notice is published as part of the National Park Service's administrative responsibilities under NAGPRA, 25 U.S.C. 3003 (d)(3). The determinations in this notice are the sole responsibility of the museum, institution, or Federal agency that has control of the cultural items. The National Park Service is not responsible for the determinations in this notice.

The 25 cultural items are 21 copper beads and 2 brass beads strung on cordage, 1 whale bone spoon, and 1 clay pipe fragment.

At an unknown date, a string of 21 copper and 2 brass beads was collected from the Swansea Burial site during excavations undertaken by Maurice Robbins. The site is located in Swansea, Bristol County, MA. In 1941, Mr. Robbins donated the beads to the Robert S. Peabody Museum of Archaeology.

Based on the funerary objects present at the site, the Swansea Burial site is considered to date to the postcontact period (post-A.D. 1500). Based on geographical, archeological, ethnographic, and historical evidence, a clear relationship of shared group identity can be demonstrated between the Swansea Burial site and the Wampanoag, who are today represented by the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, Mashpee Wampanoag Tribe (a nonfederally recognized Indian group), and Assonet Band of the Wampanoag Nation (a nonfederally recognized Indian group).

In 1955, human remains representing two individuals were removed from the Slocum River site in Dartmouth, Bristol County, MA, by Douglas S. Byers and Frederick Johnson under the auspices of the Robert S. Peabody Museum of Archaeology. The human remains were transferred to the Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, MA, in 1956. One whale bone spoon and a clay pipe fragment that were associated with these individuals are in the possession of the Robert S. Peabody Museum of Archaeology.

Based on artifact typology, the Slocum River site is dated to the Late Woodland/Early Contact period (post-A.D. 1500).

The Peabody Museum of Archaeology and Ethnology included the two individuals from the Slocum River site in a notice of inventory completion published in the **Federal Register** on August 14, 2003 (FR Doc. 03-20754, pages 48626-48634). The human remains were repatriated to the Wampanoag Repatriation Confederation on behalf of the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, Mashpee Wampanoag Tribe (a nonfederally recognized Indian group), and the Assonet Band of the Wampanoag Nation (a nonfederally recognized Indian group) on December 4, 2003.

The material culture of Native American settlements dating from the Middle Woodland period through the Historic period in southeastern Massachusetts in the area between Buzzards Bay and Narragansett Bay, where the Slocum River site and the Swansea Burial site are located, display many similar traits. Cultural continuity is reflected in settlement and subsistence patterns, material culture, and burial practices. While patterns and practices have changed over time, it is clear that the changes occurred within the original culture and were not results of migration of new groups. The Wampanoag people developed out of these earlier cultures. The Wampanoag are today represented by the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, Mashpee Wampanoag Tribe (a nonfederally recognized Indian group), and Assonet Band of the Wampanoag Nation (a nonfederally recognized Indian group).

Officials of the Robert S. Peabody Museum of Archaeology have determined that, pursuant to 25 U.S.C. 3001 (3)(B), the 25 cultural items described above are reasonably believed to have been placed with or near individual human remains at the time of death or later as part of the death rite or ceremony and are believed, by a preponderance of the evidence, to have been removed from a specific burial site of a Native American individual. Officials of the Robert S. Peabody Museum of Archaeology also have determined that, pursuant to 25 U.S.C. 3001 (2), there is a relationship of shared group identity that can be reasonably traced between the unassociated funerary objects and the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, and there is a cultural relationship between the unassociated funerary objects and the Mashpee Wampanoag Tribe (a nonfederally recognized Indian group) and the Assonet Band of the Wampanoag Nation (a nonfederally recognized Indian group).

Representatives of any other Indian tribe that believes itself to be culturally affiliated with the unassociated funerary objects should contact Malinda S. Blustain, Director, Robert S. Peabody Museum of Archaeology, Phillips Academy, Andover, MA 01810, telephone (978) 749-4490, before May 2, 2005. Repatriation of the unassociated funerary objects to the Wampanoag Repatriation Confederation on behalf of the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, Mashpee Wampanoag Tribe (a nonfederally recognized Indian group), and Assonet Band of the Wampanoag Nation (a nonfederally recognized Indian group) may proceed after that date if no additional claimants come forward.

The Robert S. Peabody Museum of Archaeology is responsible for notifying the Wampanoag Repatriation Confederation, Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, Mashpee Wampanoag Tribe (a nonfederally recognized Indian group), and Assonet Band of the Wampanoag Nation (a nonfederally recognized Indian group) that this notice has been published.

Dated: February 11, 2005.

Sherry Hutt,

Manager, National NAGPRA Program.

[FR Doc. 05-6466 Filed 3-31-05; 8:45 am]

BILLING CODE 4312-50-S

DEPARTMENT OF THE INTERIOR

National Park Service

Notice of Inventory Completion: Robert S. Peabody Museum of Archaeology, Phillips Academy, Andover, MA

AGENCY: National Park Service, Interior.

ACTION: Notice.

Notice is here given in accordance with the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3003, of the completion of an inventory of an associated funerary object in the possession of the Robert S. Peabody Museum of Archaeology, Phillips Academy, Andover, MA. The associated funerary object was removed from McCurtain County, OK.

This notice is published as part of the National Park Service's administrative responsibilities under NAGPRA, 25 U.S.C. 3003 (d)(3). The determinations in this notice are the sole responsibility of the museum, institution, or Federal agency that has control of the Native American associated funerary object. The National Park Service is not responsible for the determinations in this notice.

A detailed assessment of the associated funerary object was made by Robert S. Peabody Museum of Archaeology professional staff in consultation with representatives of the

APPENDIX F WATER SUPPLY

CDM Smith

260 West Exchange Street, Suite 300
Providence, Rhode Island 02903
tel: 401-751-5360
fax: 401-274-2173

May 22, 2012

The Honorable Thomas C. Hoye, Jr.
Mayor
Taunton City Hall
141 Oak Street
Taunton, MA, 02780

Subject: Evaluation for the Proposed Mashpee Wampanoag Project First Light

Mayor Hoye:

CDM Smith has completed our evaluation of water supply and fire protection for the Proposed Mashpee Wampanoag Project First Light located off of Stevens Street (at the intersection of routes 24 and 140) in the City of Taunton Main Service Area. We are pleased to present our analyses and results in this report.

Description of Development

The proposed project consists of the phased development of an area of land at the intersection of routes 24 and 140 in the City of Taunton. Whereas there are four proposed phases for construction, this evaluation broke them into two phases for this evaluation. In total the proposed project consists of approximately a 150,000 sq. foot Casino with approximately 300 food court seats, a 145 seat restaurant, a 165 seat restaurant, a 400 seat buffet area, 2500 parking spaces in structured parking and 10 to 12 small retail stores. In addition there will also be three 300 room hotels, a 200 seat coffee shop/restaurant and a indoor/outdoor water park.

For this evaluation, Phase I was modeled to include the demand need at the Main entrance on Stevens Street. This includes the demand for Renovations/Expansion to the Maggiore Buildings, Parking Structure/Transportation Center, 300 Room Resort Hotel, Retail, Future 300 Room Hotel, Future 200 Seat Restaurant/Coffee Shop. The average water usage for Phase I is anticipated at 167,850 gallons per day (GPD). Phase II was modeled to include the demand need at the Future entrance on Hart Street. This includes the demand for the Future Water Park and 300 Room Hotel and Events Center, which is anticipated to be about 47,100 GPD. Table 1 summarizes the flow information received from the JCJ Architecture.

Fay, Spofford & Thorndike, Inc. (FST) has proposed the following two connections to the City of Taunton's Water System for the proposed project.

- Proposed Main Entrance – Stevens Street
- Proposed Emergency Entrance – Hart Street

It is recommended that appropriate water main be provided that loops through the site and connects Stevens Street to Hart Street hydraulically. CDM Smith evaluated the ability of the Taunton Water distribution system to meet current and future water supply requirements of the proposed project at each location (i.e. each connection could provide total development flows if needed). The attached **Figure 1** shows the proposed connection locations.

Evaluation

CDM Smith evaluated the proposed project under two main criteria for water supply. First, we assessed the ability of the existing system to provide adequate pressures to service the project area under domestic day demands (i.e., average day and maximum day flow conditions). Secondly, we evaluated the existing system to provide adequate residual pressures under a maximum day flow with a required fire flow. Under all supply scenarios, CDM Smith also assessed the potential impacts caused by the proposed project on the existing water service customers.

For new facilities, the Massachusetts Department of Environmental Protection (MA DEP) has imposed a standard that the water supply system must provide a minimum pressure of 35 pounds per square inch (psi) under all domestic demand conditions. In addition, the National Fire Protection Association and MA DEP require the pressures throughout the system must remain above 20 psi under maximum day demand with fire flow conditions.

The Taunton Water Division's existing water distribution model was modified to include water service at the proposed main entrance to the project location on Stevens Street and the proposed emergency entrance on Hart Street.

For the proposed main entrance at Stevens Street, a new 16-inch main from Middleboro Avenue to the proposed entrance was modeled to supply water to the site from the main service area within Taunton. A new main was modeled because the entrance on Stevens Street is located within the East Taunton high service area, which is not sized for the demand from the proposed facilities. For the proposed emergency entrance at Hart Street we used an existing node on the 24-inch water main on Hart Street. All results pertain to the proposed water service connections at these locations.

CDM Smith has not evaluated water service, pressure requirements or pressure losses within the site and the proposed facility. Pressure requirements and pressure losses within the future project area and facility are independent of this analysis and being performed by others.

The model was used to examine several water supply and demand conditions. Using the water distribution model, CDM Smith simulated hydraulic conditions in the Main Service Area (MSA) under current system conditions and utilizing proposed demand conditions from JCJ Architecture (**memo attached and summarized in Table 1**). We have presented a summary of the analyses and our findings below.

Domestic Service

Using the Taunton water distribution model, CDM Smith evaluated water supply to the proposed project area under average day (ADD) and maximum day demands (MDD) conditions. **Table 2** (attached) presents the existing pressures at the proposed main and emergency entrances to the facility under existing conditions.

Fire Protection

The Insurance Service Office (ISO) conducts hydrant flow tests to evaluate the ability of a distribution system to fight fires. The last time ISO rated the City of Taunton was in October 1999, when 36 tests were performed. ISO defines needed fire flow as the rate of water flow, at a residual pressure of 20 psi for a specified duration, which is necessary to control a major fire in a specific structure. For this evaluation, this addressed available fire flow at the property line. Fire needs within the project area are being evaluated by others.

To conduct the fire flow simulation in the model, CDM Smith set the Prospect Hill Reservoir at its lowest operating level (assumed at 18.5 feet) at the beginning of the fire flow simulation. CDM Smith established the tank elevation as the level where there would be sufficient water in the tank to provide fire flow, while the maximum day demand would be provided by the Harris Street Pump Station and the Taunton Water Treatment Plant High Lift Pumps. By setting the tank at this water surface elevation for the fire flow simulation, we conservatively assume the worst-case scenario where the maximum amount of system demand is being withdrawn.

Results

CDM Smith has evaluated water supply and hydraulic conditions in the distribution system where the proposed project will receive water supply from the City. Pressure ranges in the Main Service Area for each scenario are shown in **Table 2**. Our evaluation determined that the City's distribution system provides adequate water service for all water supply conditions at the

proposed Emergency Entrance on Hart Street but will not supply adequate pressure utilizing existing mains at the main entrance on Stevens Street. With both existing and future maximum day demands imposed throughout distribution system, CDM Smith simulated a fire flow of 3500 gallons per minute (gpm) for a duration of 3 hours at either the main or emergency entrances to the proposed project location. The fire flow was based on ISO and AWWA M31 requirements. For both entrances, system pressures remained above the 20-psi requirement, as shown in **Table 2**. The addition of a new dedicated 16-inch main from Middleboro Avenue to the proposed entrance is recommended to provide adequate water service for all water supply conditions and fire flow needs at the Main Entrance.

Recommended Capital Improvements

Based on the results, CDM Smith feels that a new dedicated 16-inch water main should be installed from the 24-inch main in Middleboro Avenue down Pinehill Street to the Main entrance on Stevens Street, to adequately supply the requested domestic water and fire protection demands for the proposed project. The City also experiences water quality issues (i.e. "rusty" water complaints) in the Middleboro Avenue, Hart Street and County Street areas that result from water services being connected to aging, smaller mains. Improvements for these customers are recommended to occur concurrently with the required improvements for the proposed project. The following is a summary of the recommended capital improvements:

- 4,500 feet of 16" water main from the intersection of Pinehill Street and Middleboro Ave, to Stevens Street, to the proposed facility entrance (would include appurtenances like a 24" x 16" tapping sleeve and valve, line valves, fittings, hydrants, etc.)
- All existing customers along this 4,500 foot pipe route would be tied over to the new water main to resolve issues associated with multiple pipes within these streets.
- A 24" x16" tapping sleeve and valve with up to 30 feet of 16" water main to the customer property line on Middleboro Ave. This will allow for looping of service line through the customers property.
- Two meter vaults (with bypass) at the identified connection locations.
- Final overlay paving on all of Stevens Street from the customer entrance (Rt 140) to the intersection of Stevens Street and Middleboro Ave, as well as Pinehill Street to Middleboro Ave.

- Police details associated with the construction.
- Replacement of water services on Middleboro Ave, Hart Street and County Street to improve pressure and rectify issues associated with multiple water mains in these streets.
- Engineering design and services during construction.
- Estimated cost for these improvements is $2.0 million.

The City pays for most of their water system improvements through low interest (2%) State Revolving Fund (SRF) loans. At this time, there is not an available loan that would cover these costs and the scope of the project does not ensure funding in future SRF requests. It is therefore assumed that money would need to be borrowed at current market rates for these improvements.

In addition to capital improvements, the proposed customer connection will be supplied from one of the main distribution pipes for the entire City. Based on the importance of this water main and the associated pumping systems at the Taunton Water Treatment Plant that supply it, it is estimated that there will be the need for $20,000 annually for additional operation and maintenance to ensure system dependability to the site and surrounding areas.

Items for Consideration in the Inter-Governmental Agreement (IGA)

In addition to the recommended capital improvements described above, it is recommended that the proposed customer connection be prepared similarly to existing Inter-municipal Agreements (IMAs) that the City has with other consecutive system customers. Based on the existing agreements, the following items are recommended for consideration as part of the IGA negotiations:

- The City is responsible for providing service to the location of master meters at the property limit.
- The consumption measured and recorded by the City master meters located at each entrance facility will be the basis for billing.
- Information provided by the customer indicates they need 220,000 gpd on an annual daily average basis once the facility is constructed to the limits presented to this point

(through Phase 4 based on development plan provided). The City will supply up to 220,000 gpd on an annual daily average basis.

- Assuming the improvements described below are constructed, the City will be able to provide a maximum fire flow of 3500 gpm at 20 psi at the master meter locations.
- The City agrees to provide water quality at the master meter locations that complies with all relevant MA DEP and EPA standards.
- The customer is responsible for water quality, pressure and any site specific needs for all system components beyond the master meter.
- The customer should provide a pipe loop through their property to connect the two service connections before completion of what is identified as Phase 4 in the current development strategy.

It should be noted that information received to date for the proposed project DID NOT include water use related to irrigation needs for the facility. The information provided in this evaluation focused on the needs for use within the facilities and were based on the initial utility estimates provided in the attached letter dated April 13, 2012.

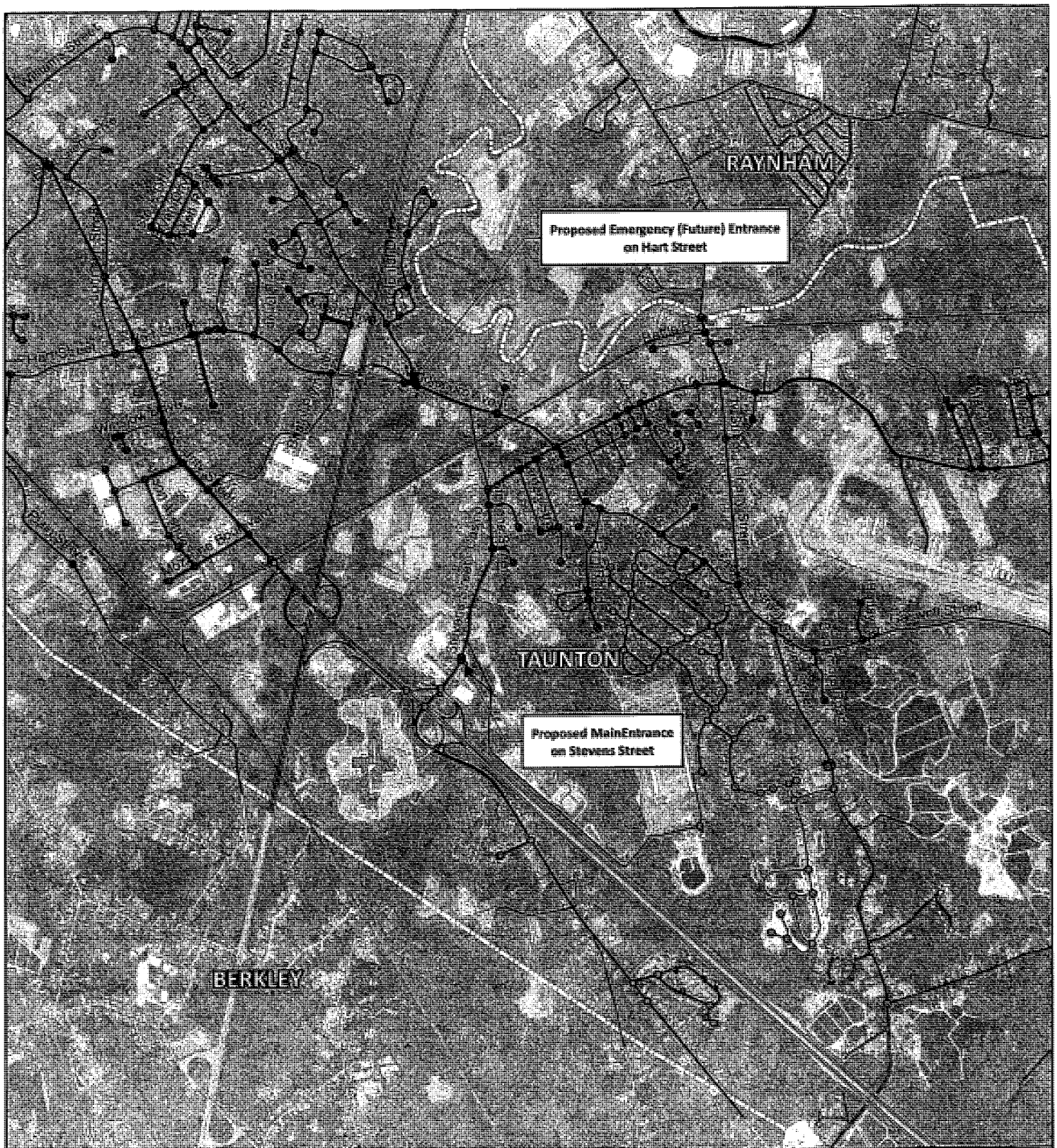
As further information related to type of development and facility needs become available, the developer should have discussions with the City of Taunton Fire Department to determine if a lower available fire flow would be acceptable. If a change occurs in the required demand or supply to the proposed project area, CDM Smith recommends performing additional model runs to reevaluate the new demand to the project area.

CDM Smith appreciates the opportunity to perform this study for the City of Taunton. We trust that this report meets your immediate needs. Should you have any questions or have need of additional services, please call me at (401) 457-0329.

Very truly yours,

Benjamin Levesque, P.E., BCEE
CDM Smith Inc.

cc: F. Adam Yanulis (CDM Smith)
Jason Buffington, Esq. (City of Taunton Law Department)



Legend

Model Junction
- Low Service
- East Taunton HSA

Water Main
- Low Service
- East Taunton HSA
- Proposed 16" Water Main

Road Edge Line

Railroad Center Line

Town Line

City of Taunton Massachusetts Water Supply System

0 700 1,400 Feet

Figure 1
Mashpee Wampanoag Water Supply and Fire Protection Evaluation

CDM Smith

Phase	Buildings	Peak Flow (gpm)	Average Daily Flow (gpd)	Average Daily Flow (gpm)	Peak Hour Flow (gph)	Peak Hour Flow (gpm)
1	Renovations/Expansion to the Maggiore Buildings	250	75,000	52	12,500	208
	Parking Structure/Transportation Center	94	13,000	9	2,200	37
	300 Room Resort Hotel	275	30,000	21	5,000	83
	Retail	67	6,600	5	1,100	18
	Totals	686	124,600	87	20,800	347
2	Future 300 Room Hotel	275	30,000	21	5,000	83
	Future 200 Seat Restaurant / Coffee Shop	75	13,250	9	2,250	38
	Future Water Park and 300 Room Hotel - Hotel	275	30,000	21	5,000	83
	- Water Park	500	17,100	12	2,900	48
	Totals	1,125	90,350	63	15,150	253
	Totals Combined Phase 1 & 2	1,811	214,950	149	35,950	599

Table 1
City of Taunton, Massachusetts
Project First Light
Summary of Water Demands

Water Supply Scenario	Stevens Street Main Entrance[4] Water Demand		Hart Street Emergency Entrance[5] Water Demand		Required Minimum Pressure	Connection at Stevens Street Entrance		Connection at Hart Street Entrance	
						Pressure	Hydraulic Grade Line	Pressure	Hydraulic Grade Line
	(MGD)	(GPM)	(MGD)	(GPM)	(PSI)	(PSI)	(FT)	(PSI)	(FT)
Existing ADD	0.00	0	0	0	35	56	195	69	194
Existing ADD[1] + Phase I [2] & Phase II [3]	0.17	117	0.05	33	35	58	199	71	198
[6] Existing ADD[1] + Phase I [2] & Phase II [3]	0.22	150	0.00	0	35	57	198	71	198
Existing MDD	0.00	0	0.00	0	35	60	205	73	203
Existing MDD[1] + Phase I & Phase II	1.49	1036	1.12	775	35	57	198	71	198
[6] Existing MDD[1] + Phase I & Phase II	2.61	1811	0.00	0	35	57	198	71	199
Existing MDD + Phase II + 3500 gpm fire flow for 3 hours & Phase I	1.49	1036	6.16	4275	20	49	180	63	180
Existing MDD + Phase I + 3500 gpm fire flow for 3 hours & Phase II	6.53	4536	1.12	775	20	29	134	63	180

NOTES:

1. ADD = Average Day Demand; MDD = Maximum Day Demand
2. Phase I was modeled to include the demand need at the Main entrance on Stevens Street. This includes the demand for Renovations/Expansion to the Maggiore Buildings, Parking Structure/Transportation Center, 300 Room Resort Hotel, Retail, Future 300 Room Hotel, Future 200 Seat Restaurant/ Coffee Shop
3. Phase II was modeled to include the demand need at the Future entrance on Hart Street. This includes the demand for the Future Water Park and 300 Room Hotel.
4. The Main Entrance is proposed to be located at the end of Stevens Street. A new 16-inch main from Middleboro Avenue to the entrance was modeled to supply water to the site from the main service area within Taunton.
5. The Future Entrance (Emergency Entrance) is proposed to be located of Hart Street. Demand was modeled off the exiting 24-inch main in Hart Street that is within the main service area in Taunton.
6. Total Demand for Phase I & II are modeled at main entrance at the end of Stevens Street with a 16-inch main looping through the site and connecting Stevens Street to Hart Street.
7. Low pressures below 35 PSI are only found in the highest elevations surrounding the Prospect Hill Tank. These pressures are currently less than 35 PSI and are not the cause of the Phase I Development.

CDM Smith

TABLE 2
City of Taunton, Massachusetts
Mashpee Wampanoag
Water Supply Fire Protection Evaluation

April 13, 2012

Mr. Bill Dow
JCJ Architecture
38 Prospect Street
Hartford, CT 06103

Re: Mashpee Wampanoag Master Planning Project
Taunton, Massachusetts

Dear Bill:

Based on the preliminary program information provided on 4/11/12, we have determined initial utility estimates that can be used for planning purposes. We have broken this information into the major portions of each intended phase of the project. As the program becomes more defined and plans are developed, we can update this information with further detail.

1. Phase 1:
    a. Renovations/Expansion to the Maggiore Buildings:
        i. Electrical:
            1. Normal Power – 8.6 MVA: This would most likely be provided via multiple utility services or bringing in power at the utility supply voltage (medium voltage) and distributing it to unit substations within the facility. Note that all electrical loads listed are connected load estimates as required by the NEC. Actual demands will be less than these estimates.
            2. Generator Power – 4.0 MVA: Multiple medium voltage generators will be provided in parallel.
        ii. Water:
            1. 6" domestic water main
            2. Peak = 250 GPM
            3. Average daily flow – 75,000 Gallons per day
            4. Peak Hour = 12,500 gallons
        iii. Sewer:
            1. 8" sanitary sewer main. This would most likely be broke up into multiple connections once the plans are developed and locations are known of venues and site services.
        iv. Gas:
            1. 46,000 CFH.

330 Congress St., Boston, MA 02210, USA
T: +1.617.951.0061 • www.exp.com

b. Parking Structure/Transportation Center:
   i. Electrical:
      1. Normal Power – 0.5 MVA
      2. Generator Power – .2 MVA

   ii. Water:
      1. 3" domestic water main
      2. Peak = 94 GPM
      3. Average daily flow – 13,000 Gallons per day
      4. Peak Hour = 2,200 gallons
   iii. Sewer:
      1. 4" sanitary sewer main.
   iv. Gas:
      1. 500 CFH.

c. Grade Parking:
   i. Electrical:
      1. Normal Power – 0.05 MVA
      2. Generator Power –0.02 MVA
   ii. Water, Sewer, Gas: Not anticipated.

d. 300 Room Resort Hotel:
   i. Electrical:
      1. Normal Power – 3.5 MVA - This would most likely be provided via multiple utility services or bringing in power at the utility supply voltage (medium voltage) and distributing it to unit substations within the facility.
      2. Generator Power – 1.5 MVA – (1) large generator would be utilized, or this could be provided from the casino parallel generator location (and add this capacity to that system). This would be determined during schematics.
   ii. Water:
      1. 6" domestic water main
      2. Peak = 275 GPM
      3. Average daily flow – 30,000 Gallons per day
      4. Peak Hour = 5,000 gallons
   iii. Sewer:
      1. 10" sanitary sewer main, or multiple 6" and 8" connections based on coordination with the civil engineer.
   iv. Gas:
      1. 14,000 CFH.

e. Retail:
   i. Electrical:
      1. Normal Power – 0.5 MVA
      2. Generator Power – 0.07 MVA
   ii. Water:
      1. 3" domestic water main
      2. Peak = 67 GPM
      3. Average daily flow – 6,600 Gallons per day
      4. Peak Hour = 1,100 gallons
   iii. Sewer:
      1. 4" sanitary sewer main
   iv. Gas:
      1. 700 CFH.

2. Phase 2:
   a. Future 300 Room Hotel
      i. Electrical:
         1. Normal Power – 3.5 MVA - This would most likely be provided via multiple utility services or bringing in power at the utility supply voltage (medium voltage) and distributing it to unit substations within the facility.
         2. Generator Power – 1.5 MVA – (1) large generator would be utilized, or this could be provided from the casino parallel generator location (and add this capacity to that system). This would be determined during schematics.
      ii. Water:
         1. 6" domestic water main
         2. Peak = 275 GPM
         3. Average daily flow – 30,000 Gallons per day
         4. Peak Hour = 5,000 gallons
      iii. Sewer:
         1. 10" sanitary sewer main, or multiple 6" and 8" connections based on coordination with the civil engineer.
      iv. Gas:
         1. 14,000 CFH.

   b. Future 200 Seat Restaurant / Coffee Shop:
      i. Electrical:
         1. Normal Power – 0.6 MVA
         2. Generator Power – 0.16 MVA
      ii. Water:
         1. 3" domestic water main
         2. Peak = 75 GPM
         3. Average daily flow – 13,250 Gallons per day
         4. Peak Hour = 2,250 gallons
      iii. Sewer:
         1. 6" sanitary sewer main
      iv. Gas:
         1. 3,300 CFH.

c. Future Water Park and 300 Room Hotel:
    i. Electrical:
        1. Normal Power – 5.5 MVA
        2. Generator Power – 1.9 MVA
    ii. Water:
        1. Hotel
            a. 6" domestic water main
            b. Peak = 275 GPM
            c. Average daily flow – 30,000 Gallons per day
            d. Peak Hour = 5,000 gallons
        2. Park
            a. 8" domestic water main
            b. Peak = 500 GPM
            c. Average daily flow – 17,100 Gallons per day
            d. Peak Hour = 2,900 gallons
    iii. Sewer:
        1. Hotel:
            a. 10" sanitary sewer main, or multiple 6" and 8" connections based on coordination with the civil engineer.
        2. Park:
            a. 12" sanitary main.
    iv. Gas:
        1. 80,000 CFH

d. Future Parking Structure:
    i. Electrical:
        1. Normal Power – 0.5 MVA
        2. Generator Power – .2 MVA
    ii. Water, Sewer, Gas: Not anticipated.

3. <u>Project Totals</u>
    a. Phase 1:
        i. Power:
            1. Total Normal Load: 13.2 MVA.
            2. Total Generator Load: 5.8 MVA.
        ii. Water:
            1. A peak diversified flow of approximately 515 GPM can be anticipated from the above estimates, which can be provided via a 8" line.
        iii. Sewer:
            1. A 14" site sanitary main can be anticipated for the above sanitary estimates.
        iv. Gas:
            1. 61,200 CFH.

b. Phase 1 and 2 combined:
    i. Power:
        1. Total Normal Load: 23.3 MVA. If this is provided at 13.2 kV, this would equate to 1200A, 15kV service entrance gear being required. As noted above, the load estimated is connected load and the actual demand will be significantly less than this estimate.
        2. Total Generator Load: 9.6 MVA. This would require multiple 2.5 MW and 2.0 MW generators in parallel. Locations and quantities would be determined during schematics.
    ii. Water:
        1. A peak diversified flow of approximately 1,400 GPM can be anticipated from the above estimates, which can be provided via a 14" line.
    iii. Note: the above flow is in regards to domestic water use only. In regards to fire protection water, the IFC would require 6000 GPM for a period of four hours for the entire site. An exception allows a reduction of this by 75%. If it is found that a reliable water source is not provided by the utility, a tank of approximately 360,000 gallons could be necessary.
c. Sewer:
    i. A 24" site sanitary main can be anticipated for the above sanitary estimates (entire project)
d. Gas:
    i. 158,500 CFH. Actual demand will be significantly less than this and can be further determined during design. A significant gas load has been carried for the water park at this point, which will most likely be reduced once the full scope is known of this portion.

Please review the above information and do not hesitate to contact our office with any questions.

Sincerely,

Exp U.S. Services, Inc.

Paul R. Van Kauwenberg, P.E.
Principal

Appendix H-6
Attachment to Letter from International Brotherhood of Electrical Workers
Local Union 223

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

Re: Wampanoag Tribe of Mashpee – Taunton Land into Trust for Initial Reservation

Dear Regional Director Keel:

I am writing in support of the Mashpee Wampanoag Tribe's application for land into trust for Taunton Massachusetts. I feel that the tribe's application and proposal for the land is proper and will benefit the City and Southeastern Massachusetts.

I ask that you and the Department of Interior look favorably upon this application and grant their request.

I am confident that the right decision for the surrounding communities will be to support this proposal.

Thank you and have a good day.

Sincerely,

David A. Garcia

221 Lakeshore Dr.

Marlborough, MA 01752

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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I am confident that the right decision for the surrounding communities will be to support this proposal.

Thank you and have a good day.

Sincerely,

Michael Cohen

1879 Smith St

Dighton MA 02715

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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I am confident that the right decision for the surrounding communities will be to support this proposal.

Thank you and have a good day.

Sincerely,

Scott Ramsay

879 Meridian St

Fall River, Ma 02720

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

David Monrow

35 Hickory Rd Halifax MA 02338

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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I am confident that the right decision for the surrounding communities will be to support this proposal.

Thank you and have a good day.

Sincerely,

JOSEPH REVIL

620 HIGH ST

BRIDGEWATER MA

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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I am confident that the right decision for the surrounding communities will be to support this proposal.

Thank you and have a good day.

Sincerely,

Patrick Greene

173 Highland St. #205

Taunton MA 02780

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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I am confident that the right decision for the surrounding communities will be to support this proposal.

Thank you and have a good day.

Sincerely,

Richard Vohnoutka

421 Reed Rd.

N. Dartmouth MA. 02747

December 11, 2013

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Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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I am confident that the right decision for the surrounding communities will be to support this proposal.

Thank you and have a good day.

Sincerely, Scott Edwards

SCOTT EDWARDS

168 CEDAR ST

W. BARNSTABLE MA
02668

December 11, 2013

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Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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I am confident that the right decision for the surrounding communities will be to support this proposal.

Thank you and have a good day.

Sincerely, Ken Kelley

Ken Kelley

10 Restful Lane

Wareham Ma

December 11, 2013

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Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

John R DeMarinelle

John R DeMarinelle

P.O. Box 523 Assonet, MA 02702

December 11, 2013

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Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Scott Blackler
38 Arnold St.
West Wareham, Ma
02576

December 11, 2013

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Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
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Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

226 County Rd
E. Freetown MA 02717

December 11, 2013

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Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Jack Crewe

24 Lakeview Dr

Sandwich, MA, 02563

December 11, 2013

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Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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I ask that you and the Department of Interior look favorably upon this application and grant their request.

I am confident that the right decision for the surrounding communities will be to support this proposal.

Thank you and have a good day.

Sincerely,

Joseph L. Boyle Jr.

173 Jones St.

Fall River, MA. 02720

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

Re: Wampanoag Tribe of Mashpee – Taunton Land into Trust for Initial Reservation

Dear Regional Director Keel:

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I am confident that the right decision for the surrounding communities will be to support this proposal.

Thank you and have a good day.

Sincerely,

Erica Tolbrwell

57 Princeton St.

New Bedford, MA 02745

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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I am confident that the right decision for the surrounding communities will be to support this proposal.

Thank you and have a good day.

Steven M Barry

Sincerely,

Steven M Barry

113 Marchant St 2nd Flr

Fall River MA 02723

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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I am confident that the right decision for the surrounding communities will be to support this proposal.

Thank you and have a good day.

Sincerely,

Glenn D. Mason

Glenn D. Mason

56 N. Main St Berkley MA
02779

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Jacob Santos

315 Hemlock St Dartmouth

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Francis M. Welch

FRANCIS M. WELCH

389 HALL ST.

RAYNHAM, MA. 02767

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

DOUGLAS P. NELSON

4 COURTNEY LN P.O. BOX 1317

SOUTH DENNIS, MA 02660

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Brian Bresnahan

8 Jenny Cind St Taunton MA.

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

David A. Pereira

DAVID A. Pereira

11 Honora Lane Bourne MA. 02532

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Robert M. Revil

Sincerely,

Robert M. Revil

822 High Street

Bridgewater, MA. 02324

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Robert Rindom

24 yellow Pine rd #5

Buzzards Bay MA 02532

December 11, 2013

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Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Stephen M Curran

Sincerely,

Stephen Curran

251 Auburn St

Whitman MA 02382

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

ANDREW CAMA

1 Wing Street

Westport, MA 02790

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

_____

_____

_____

December 11, 2013

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Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
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Thank you and have a good day.

Sincerely,

Roberto Marinaro

71 west ST

West Bridgewater MA 02379

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Jessica Quinn

180 Main Street #6208

Bridgewater, MA 02324

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Nicole Robbins

Nicole Robbins

45 Howlands Ln

Kingston MA 02364

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Benjamin Jacobs

262 Taylor Ave

PLYMOUTH, MA 02360

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Robert Wordell

274 Long Highway

Little Compton RI, 02837

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Milton Bradley

Sincerely,

Milton Bradley

95 Braley Road,

East Freetown, MA, 02717

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

David Lewin

Sincerely,

David Lewin

76 Matthews Drive

East Taunton, MA, 02718

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Alex Whitman

Sincerely,

Alex Whitman

63 Walnut Street

Abington, MA 02351

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Steven Rios

Sincerely,

30 Dartmouth Farm Trail

Dartmouth Ma, 02747

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Joshua Strolsky

50 Elm St.

Berkley, MA 02779

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Justin Hunton

Sincerely,

Justin Hunton

23 Bennett st Ext.

Taunton, MA 02780

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Justyn Clarke

Sincerely,

Justyn Clarke

65 Highland Avenue

Dartmouth MA, 02747

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Martin D. McDonald

Sincerely,

Martin D. McDonald
15 Whitman St. Apt. #1
Weymouth, MA 02189

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Brock Antoine

62 Main Rd Apt 1

Tiverton, RI 02878

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Michael Torres

Michael Torres

1940 Phillips Rd Apt 25

New Bedford MA 02745

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Thomas Pacella

Sincerely,

Thomas Pacella

1010 Main Street

Hanover MA, 02339

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

DANIEL Ogden

Sincerely,

Daniel Ogden

251 DAVES road

WESTPORT MA 02790

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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I am confident that the right decision for the surrounding communities will be to support this proposal.

Thank you and have a good day.

Sincerely,

Jared Titus

168 Long Pond Dr.

South Yarmouth, MA 02664

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

2A Rolling Green Dr.

Fall River MA 02720

William P Grew

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Brian O Ferreira

Sincerely,

Brian Ferreira

29 James St.

Taunton MA 02780

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Todd Eddy

Sincerely,

Todd Eddy

16 Oregon Road

Mashpee, MA 02649

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

William Beetles

Sincerely,

William Butler

210 Prospect Hill St

Taunton, MA 02780

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Ryan Thomas

Ryan Thomas
740 Glebe St

Taunton, MA 02780

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

(JEFF KULAS)

98 WINTER ST

TAUNTON MA, 02780

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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I ask that you and the Department of Interior look favorably upon this application and grant their request.

I am confident that the right decision for the surrounding communities will be to support this proposal.

Thank you and have a good day.

Sincerely,

Mike Vigneau

Mike Vigneau

Taunton, MA

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

Re: Wampanoag Tribe of Mashpee – Taunton Land into Trust for Initial Reservation

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Thank you and have a good day.

Sincerely,

Kevin Johnson

114 Brentwood circle, Plymouth, MA

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Paul Fernandes

Paul Fernandes

255 Plain st Taunton MA 02780

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

John Zeppenfeld

20 N. Pleasant St. Taunton, MA

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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I am confident that the right decision for the surrounding communities will be to support this proposal.

Thank you and have a good day.

Sincerely,

Patrick A M Weeks

4 Bradford St. Plymouth, MA

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Peter Bianchini

13 Clayton Road

Middleboro MA 02346

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Patrick Cunningham

1 McIntosh Dr

Taunton MA 02780

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely, St Johnson

Steven Johnson

115 Pratt St

Mansfield MA 02048

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Adil Rafiki

Sincerely,

Adil Rafiki

19 Pleasant St

Carver, 02330.

December 11, 2013

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Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Justin Parant
21 White Falls Trl.
Wakefield RI 02879

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Eric Desrosiers
10 Captains LN
Mattapoisett, MA 02739

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Alex Anacki

Sincerely,

Alex Anacki

139 Union Street

Bridgewater MA 02324

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Timothy M. Petruitis

18 Kalmia Rd

Holbrook Ma 02343

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Mark Slavick

19 Hoffman St

Taunton Ma 02780

December 11, 2013

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Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Taylor Wirth

44 Orchard St

Taunton MA

December 11, 2013

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Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Michael Ogden

Sincerely,

Michael Ogden

251 Davis Rd

Westport MA 02790

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Lucas Sheehan

25 Highstone Street

East Taunton MA 02718

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Daniel Woodward

44 Lopes rd

Somerset MA, 02726

December 11, 2013

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Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Thomas QS Hendricks Jr

22 Morse Place

Fall River, Ma 02724

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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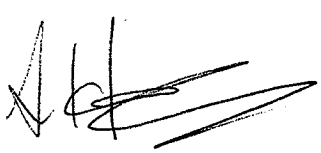
Sincerely,



Sean Hastings

41 Bay St

Fairhaven, MA 02719

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Kenneth P. Silva Jr.
13 Whippoorwill
Wareham MA 02571

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely, Jordan M Cookson

15 South St

Hanson MA 02341

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Jared Dumont

378 Goodwin St

Fall River MA

December 11, 2013

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Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely, Andrew Straight

126 Nelson Street

Fall River, Ma

02721

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Christopher M Bulger
169 Liberty St.
Randolph, MA 02368

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Scott Peterson

13 Robert Frost Drive

Randolph ma, 02368

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Neil OBrien

30 Pine St.

Carver, MA 02330

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Sincerely,

Justin Huber

98 Indian rd

Norton MA 02766

December 11, 2013

Franklin Keel
Regional Director, Eastern Regional Office
Bureau of Indian Affairs
545 Marriott Drive
Suite 700
Nashville, Tennessee 37214

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Thank you and have a good day.

Patrick Donnelly

Sincerely,

Patrick Donnelly

15 Laplante St.

Fall River, MA 02724